

**Postpartum nutrition education services for
HIV-positive Ghanaian women are scarce despite
their increased risk of weight loss**

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ABSTRACT

Predictors of weight change throughout the first year postpartum were examined using data from 314 Ghanaian HIV-positive (HIV-P) and HIV-negative (HIV-N) women. The overall effect over one year postpartum was a loss in average weight in HIV-P women and a gain in average weight in HIV-N women. After controlling for confounders, weight change was negatively associated with being HIV-P and having a higher number of days of breastfeeding and illness, and positively associated with being a trader. To complement the quantitative analysis, qualitative data on nutrition education services provided to HIV-P women in Ghana were collected through focus group discussions with 38 HIV-P women, and semi-structured interviews with 12 health workers, 5 non-governmental and governmental personnel and a community leader. Financial insecurity, low support from health services, and stigma limited the women's ability to follow recommendations received. Barriers to providing more nutrition education included lack of audience-appropriate materials and in-service training. HIV-P women may need individualized nutrition counselling to help them maintain a normal weight during the postpartum period.

RÉSUMÉ

Les prédicateurs du changement de poids durant la première année postpartum ont été examinés en utilisant des données de 314 femmes Ghanéennes VIH-positives (VIH-P) et VIH-négatives (VIH-N). L'effet achevé après un an postpartum, en moyenne, était une perte de poids par les femmes qui sont VIH-P et un gain de poids par les femmes qui sont VIH-N. Après avoir contrôlé d'autres facteurs, le changement de poids se retrouve négativement corrélé avec VIH-P et le fait d'avoir plus de jours d'allaitement et des maladies, par contre positivement associé avec être un trader. De plus, pour compléter l'analyse quantitative, des informations qualitatives sur les services d'éducation nutritifs fournis aux femmes qui sont VIH-p à Ghana ont été recueillis grâce à des discussions de groupe avec 38 femmes VIH-p, et aussi à travers des entrevues semi-structurées avec 12 inspecteurs de santé, 5 non gouvernementales et gouvernementales personnels et un dirigeant de la communauté. Les obstacles à une éducation nutritionnelle figuraient notamment le manque d'auditoire de matériels appropriés et de la formation continue. L'insécurité financière, le faible soutien des services de santé, et la stigmatisation limite la capacité des femmes à suivre les recommandations reçues. Les femmes VIH-P auraient éventuellement besoin de conseils de nutrition individuels pour les aider à maintenir un poids normal au cours de la période postpartum.

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CONTRIBUTION OF AUTHORS

The manuscripts included in this thesis were accomplished through collaborative efforts from the co-authors.

The first manuscript was part of the Research to Improve Infant Nutrition and Growth (RIING) in Ghana (2004-2008). The principal investigators for the project were: G.S. Marquis, A. Lartey, R. Perez-Escamilla and R. Mazur, with L. Brakohiapa acting as a consultant to the project. H. Chehayber worked together with G.S. Marquis to develop the research objectives and hypotheses included in the first manuscript of this thesis. H. Chehayber was also responsible for the completion of statistical data analysis and the preparation of the first manuscript with continuous guidance from G.S. Marquis. The thesis supervisor (G.S. Marquis) and committee members (T. Johns and A. Lartey) reviewed and edited initial drafts of the whole thesis.

The second manuscript was authored by H. Chehayber, G.S. Marquis, and A. Lartey. H. Chehayber developed the research questions, wrote the project proposal, and travelled to Ghana (June-September 2010) where she supervised and participated in data collection in Accra and Manya Krobo districts of the Greater Accra and Eastern region of Ghana, respectively. This involved developing the semi-structured interview guides, recruiting and training local field workers to use the interview guides, and participating in data collection with the help of local interpreters. H. Chehayber also transcribed the interviews with the help of local field workers, managed and analyzed the data, and wrote the second manuscript. All of this was accomplished with guidance and support from the co-authors. G.S. Marquis and A. Lartey edited the second manuscript. The data collected for the second manuscript was done solely as part of H. Chehayber's thesis.

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LIST OF ABBREVIATIONS

AED: Academy of Educational Development
AIDS: Acquired immune deficiency syndrome
ART: Antiretroviral therapy
ARV: Antiretroviral drugs
BMI: Body mass index
CDC: Centres for Disease Control and Prevention
DSM-III: Diagnostic and Statistical Manual of Mental Disorders
EPDS: Edinburgh Postnatal Depression Scale
FANTA: Food and Nutrition Technical Assistance Project
FAO: Food and Agricultural Organization
FGD: Focus group discussion
GHS: Ghana Health Service
GO: Governmental organization
HAART: Highly active antiretroviral therapy
HFIMS: Household Food Insecurity Measurement Scale
HIV: Human immuno-deficiency syndrome
HIV-N: HIV-negative
HIV-P: HIV-positive
HIV-U: HIV-unknown
IHCC: International Health Care Centre
MTCT: Mother-to-child transmission
NAP+: National Association of Positive Persons
NGO: Non-governmental organization
OICI: Opportunities Industrialization Centre International
OVC: Orphans and Vulnerable Children
PCA: Principal Component Analysis
PLWHA: People living with HIV/AIDS
PMTCT: Prevention of mother-to-child transmission
RIING: Research to Improve Infant Nutrition and Growth
SES: Socio-economic status
SSA: Sub-Saharan Africa

THM: Traditional Herbal Medicines

UNAIDS: The Joint United Nations Programme on HIV/AIDS

USAID: United States Agency for International Development

USDA: United States Department of Agriculture

USDA-HFSSM: the United States Department of Agriculture Household
Food Security Survey Module

VCT: Voluntary counselling and testing

WAAF: West Africa AIDS Foundation

WHO: World Health Organization

WUAAG: Women United Against AIDS in Ghana

CHAPTER 1: GENERAL OVERVIEW

Introduction

According to the Joint United Nations Programme on HIV/AIDS (UNAIDS), approximately 17 million women worldwide between the ages of 15 and 49 years are infected with the human immune-deficiency virus (HIV) and affected by the acquired immune-deficiency syndrome (AIDS)(UNAIDS, 2010). HIV/AIDS has affected women from sub-Saharan Africa (SSA) in disproportionate numbers more than anywhere else in the world. In Ghana, for example, the prevalence of HIV/AIDS in adults 15-49 years of age is almost twice as high in women as in men (2.7% vs. 1.8%) (Ghana Statistical Service, 2004). HIV-positive (HIV-P) women in developing countries are particularly vulnerable to nutritional deficiencies because of likely inadequate dietary intake and potentially increased nutrient requirements associated with HIV and other infections and the increased nutritional demands of frequent pregnancy and lactation periods (Papathakis & Rollins, 2005). During HIV infection, inadequate intakes may contribute to weight loss that has been associated with an increased risk of morbidity and mortality (Macallan, 1999).

The World Health Organization (WHO) recommends that HIV-P women should avoid breastfeeding “when replacement milk is acceptable, feasible, affordable, sustainable and safe” (WHO, 2001). However, African women often consider the use of replacement milk for infant feeding to be unacceptable, unaffordable, or unsafe (Papathakis & Rollins, 2005; Latham & Preble, 2000). Therefore, lactation, a nutritionally demanding physiological stage, will likely remain the norm for HIV-P women in most of Africa irrespective of its effect on health. Therefore, because breastfeeding remains the most common form of infant feeding for women in SSA, it is important to understand the effect of HIV infection on the nutritional status of breastfeeding women. (Raisler & Cohn, 2005; Papathakis & Rollins, 2005).

Nutritional support is an integral part of a comprehensive response to HIV/AIDS (The United States President's Emergency Plan for AIDS Relief, 2006). Nutrition education is one of the components of nutritional support and it may assist in maintaining nutritional status by preventing weight loss and the development of nutritional deficiencies. Therefore, HIV-P women need to be educated about healthy balanced diets for their health and physiological requirements (Bijlsma & Kangara, 1997).

The present study examined postpartum weight change in HIV-P and HIV negative (HIV-N) Ghanaian women throughout the first year postpartum and the availability and quality of nutrition education services provided by governmental and non-governmental organizations for HIV-P women in Ghana.

Study Rationale

Although the majority of HIV-P women are of reproductive age, the effect of pregnancy or lactation on health and disease progression has received little attention. In most trials addressing HIV-P women, the primary focus of nutrition education has been on the infant rather than the HIV-P women (Raisler & Cohn, 2005; Papathakis & Rollins, 2005).

Increased energy and nutrients are required during HIV infection and during lactation (Grinspoon et al., 1998; Butte & King, 2005). Therefore, the combination of HIV infection and lactation may lead to increased risk of maternal nutritional deficiencies if diet is inadequate. In addition, because breastfeeding remains the most common form of infant feeding for women in SSA, it is important to understand the effect of HIV infection on the nutritional status of breastfeeding women. (Raisler & Cohn, 2005; Papathakis & Rollins, 2005). Currently, there are no explicit nutritional recommendations for HIV-P lactating women.

Appropriate nutrition support that includes nutrition education can have a major effect on morbidity and mortality and may also result in improvements in immune function (Coodley et al., 1994; Liss, 2000). However, hospital funding and staff time are often directed to carrying out nutrition education that focuses only on the infant, leaving little time for nutrition assessment, education and counselling that is directed to women (Raisler & Cohn, 2005; Papathakis & Rollins, 2005). HIV-P women, whether pregnant or lactating or neither, should be educated about healthy balanced diets for their health and physiological requirements. HIV-related nutrition therapy requires specialized knowledge of nutrition, especially in relation to the disease, medications, and complications, paying close consideration to the social and cultural environment of the infected and affected individuals involved. Health services can play an important role in assuring good nutritional status by providing appropriate nutrition support for HIV-P women. Therefore, further research is needed to investigate nutrition education activities and counselling practices in health facilities and the role they play in providing adequate and consistent nutrition education messages in Ghana. By investigating the perspectives of health workers, non-governmental program managers, and influential community members, a more local and contextual viewpoint of the barriers and facilitators to change can be obtained. Greater insight into the factors that affect the delivery of HIV-related nutrition messages in Ghana can help to shape recommendations for improvement. Additionally, suggestions from health workers and community members can better inform recommendations from a local perspective. Ultimately, understanding the facilitators and the barriers to good maternal nutrition has major implications for the health and well-being of the Ghanaian population. The results from this study are intended to provide greater insight on how to incorporate nutrition education for HIV-P women into future programs designed to improve nutrient intake and status.

Overall study aim

The purpose of this study is to identify predictors of weight change in HIV-P and HIV-N women across the 1st year postpartum in Ghana and to examine nutrition education services provided by governmental and non-governmental organizations for HIV-P women in Ghana.

Specific objectives and hypotheses

- 1) To identify the patterns and predictors of weight change in HIV-P and HIV-N Ghanaian women across the 1st year postpartum, using the Research to Improve Infant Nutrition and Growth (RIING) Project data set.
- 2) To document nutrition education and support activities for HIV-P Ghanaian women.
- 3) To investigate the barriers and facilitators of providing nutrition education in the context of HIV infection.

Hypothesis related to primary objective #1

- 1) Women who are HIV-P experience a greater weight loss than HIV-N women
- 2) Social capital and education modulate the effect that HIV has on weight loss.

Qualitative research questions

For health-care providers/non-governmental organizations

- a. What nutrition messages do HIV-P women receive?
- b. What influences the content of nutrition education and how it is offered?
- c. How can health services improve the delivery of HIV-relevant nutrition education in the communities? What are the barriers and facilitators to change?

For HIV-P women

- d. What are the main sources of nutrition information?
- e. What are the facilitators and barriers to optimal nutritional status?
- f. How do cultural beliefs, attitudes and experiences affect HIV-P women's health seeking behavior and dietary practices?

CHAPTER 2: LITERATURE REVIEW

The HIV/AIDS epidemic

Approximately 33.3 million people worldwide are infected with HIV/AIDS at the end of 2009 (UNAIDS, 2010). SSA is home to about 10% of the world's population, and accounts for two-thirds (67%) of HIV infections worldwide. In SSA the predominant modes of transmission are heterosexual sex and mother-to-child transmission (Anabwani & Navario, 2005). In 2009, an estimated 1.8 million people living in SSA became newly infected with HIV, bringing the total number of people living with HIV to 22.5 million (UNAIDS, 2010). The rate of new HIV infections is lower than the estimated 2.2 million people in SSA who became newly infected with HIV in 2001. However, despite the decline in the rate of new HIV infections in SSA, the epidemic continues to have a negative impact on households, communities, businesses, public services and national economies in the region. It weakens governance, compromises human capital, decreases productivity and reduces economical growth by discouraging both local and foreign investments (Haddad & Gillespie, 2001).

Situating women within the context of HIV infection

According to UNAIDS, approximately 17 million women worldwide between the ages of 15 and 49 years are HIV-P (UNAIDS, 2010). In 1985, roughly half a million women and half a million men were living with HIV/AIDS in SSA. Since then, the number of women living with HIV/AIDS relative to men has increased every year, particularly affecting young women 15 to 24 years of age, who are now more than three times more likely to be infected than young men. In Kenya, young women between 15 and 19 years of age are three times more likely to be infected than their male counterparts, while 20 to 24 year old women are 5.5 times more likely to be living with HIV than men in their age cohort. Among people 15 to 24 years of age in the United Republic of Tanzania, females are four times more likely than males to be living with HIV.

Results from the 2008 Ghana Demographic and Health Survey (GDHS) indicate that 2% of Ghanaian adults 15-49 years of age are HIV-P (2.7% women and 1.5% men) (Ghana Statistical Service, 2008a). Reasons for this disproportionate disease burden include: (1) women are biologically more susceptible to HIV infection than men, and (2) their vulnerability is increased by gender inequality, sexual violence, lack of power in sexual relationships, poverty, economic dependence and low education (Raisler & Cohn, 2005).

HIV Infection and Nutrition: Conceptual Framework

Malnutrition is the most common manifestation of HIV infection and has been recognized as a significant prognostic factor to the advanced stages of the disease (Kotler et al., 1989; Guenter et al., 1993; Suttman et al., 1995). HIV infection specifically affects nutritional status by reducing food intake (lack of appetite and difficulty with eating due to mouth lesions), increasing energy requirements (especially in the presence of opportunistic infections such as tuberculosis) and causing poor nutrient absorption. Malnutrition in turn further weakens the immune system, increasing susceptibility to infections, and worsening the disease's impact. Given the variable course of the disease in different patients, any one or more or none of these mechanisms may come into play.

Increased energy expenditure and altered body composition

Changes in metabolism in HIV-P individuals occur as a result of the immune system's response to HIV infection. When the body mounts its acute phase response to infection, it releases pro-oxidant cytokines and other oxygen-reactive species. These cytokines produce several results, including anorexia which causes lower intake of food, and fever which increases energy requirements (Seumo-Fosso & Cogill, 2003). Grinspoon et al. (1998) found higher resting energy expenditures, even in the absence of secondary infections. Resting energy expenditure (REE) in 33 HIV-P women was higher than in 26 HIV-N weight matched control women (1624 ± 329 kcal/d

compared with 1437 ± 145 kcal/d, $P = 0.0096$). REE was determined by indirect calorimetry and body composition by dual-energy X-ray absorptiometry (DXA), bioelectrical impedance analysis, and skinfold-thickness analysis. Based on such studies that showed an increase in HIV-P individual's energy expenditure, the WHO's recommendation for asymptomatic HIV-P adults is to increase energy requirements by 10% to maintain body weight and physical activity (WHO, 2003). During symptomatic HIV, and subsequently during AIDS, energy requirements increase by approximately 20% to 30% to maintain adult body weight.

Reduced food intake and malabsorption

In contrast to the numerous studies that report changes in body composition or decreases in individual nutrient status during HIV infection, there is relatively little evidence and no up-to-date research measuring dietary intake in HIV-P individuals. Chlebowski et al. (1989) used 7-food day records to examine the dietary intake in 14 patients with AIDS and 14 patients with asymptomatic HIV infection. All reported differences were significant at $P < 0.05$. Patients with AIDS consumed an average of 266 kcal per day less than HIV-P persons (2048 ± 193 vs. 2314 ± 117 kcal per day, respectively). The intakes of protein and carbohydrate were similar in the two groups, but fat intake was lower in the patients with AIDS. The patients with AIDS experienced significant weight loss (8.7 ± 4.0 percent) and had decreased serum albumin concentrations and decreased CD4⁺ cell numbers; these changes were not evident in the HIV-P asymptomatic patients. The study demonstrated that reduced food intakes and weight loss at the advanced stages of the disease may have serious implications on health and nutritional status.

Some of the factors mentioned in the literature that led to reduced food intake included: lesions caused by fungi and viruses, oral candidiasis, changes in taste perception, oesophageal obstruction, abdominal pain, nausea, vomiting, diarrhoea and early satiety (Summerbell, 1994; Thomas, 1994). In addition, diarrhoea and malabsorption of fats, carbohydrates and vitamin B12 appear to

be common in all stages of HIV infection; and these complications contribute to reduced food intake and weight loss in HIV-P individuals. Malabsorption may occur for a number of reasons, although the actual mechanisms of malabsorption in HIV infection are poorly understood, studies often associate malabsorption with gastrointestinal tract dysfunction. In HIV infection, the gastrointestinal tract is vulnerable to opportunistic pathogens and secondary malignancies (Calderon et al., 1990), causing decreased food intake because patients with diarrhoea attempt to reduce fecal output by restricting food consumption or because of decreased appetite as a response to the presence of unabsorbed nutrients in the lower intestine (Summerbell, 1994).

Drug- nutrient interaction

Patients with HIV/AIDS often receive a wide variety of drugs for prophylaxis or treatment of complications. Many of these drugs have the potential for serious side effects that affect appetite or eating behaviour. Some of these side effects include stomatitis, dysgeusia, nausea, vomiting, and mucositis (Raiten et al., 2005). All of these side effects can lead to malnutrition. Alternatively, the presence of malnutrition affects the integrity of the gastrointestinal tract by decreasing pancreatic enzyme secretion and intestinal brush border enzyme activities, which decrease drug absorption (Raiten et al., 2005). The biological activities required for the activation of most drugs that are needed for HIV-P individuals are dependent on adequate amounts of available macronutrients (fat, protein, carbohydrates), again emphasizing the importance of maintaining good nutritional status during HIV infection.

Other factors that may influence nutritional status during HIV infection

Figure 2.1 depicts the multitude of physiological, socioeconomic, social and psychosocial factors involved in HIV disease that could affect nutritional status. The following paragraphs discuss evidence from the literature suggesting how these factors can influence nutritional status.

Psychosocial factors

Living with HIV, a major psychological stressor, along with having caregiving responsibilities, may lead to depression (Dalmida, 2006). The lifetime prevalence of depression in HIV-infected individuals has been estimated at 22–45%. The signs and symptoms of depression are similar in HIV-infected and non-infected patients, but patients with HIV infection may more frequently have sleep and appetite disturbances (Penzak et al., 2000). Decreased appetite and weight loss are among the diagnostic criteria for depression (American Psychiatry Association, 1994). Studies have shown that depressive symptoms are associated with non-adherence to antiretroviral therapy (Byakika-Tusiime et al., 2009), faster disease progression (Antelman et al., 2007), and poorer quality of life (Adewuya et al., 2008).

Women in particular are vulnerable to depressive symptoms especially during the postpartum period, partly due to hormonal changes; however, few studies have focused on postpartum depression with respect to HIV. Factors affecting postnatal depressive symptoms include prenatal depressive symptoms, low emotional support, low self-esteem, education, infant health status, poor physical health, unplanned pregnancy, and higher parity (Ross et al., 2011). Because changes to appetite and body weight are among the diagnostic criteria for depression (American Psychiatry Association, 1994), poor nutrition may be simply a consequence of the disorder, research has yet to establish cause and effect.

Sociodemographic characteristics

Villamor et al. (2005) found that age and level of education were inversely and significantly related to the risk of a first episode of wasting indicated by a mid-upper arm circumference (MUAC) < 22 cm in HIV-P women. After adjustment, women aged < 20 years old had a 1.8-fold greater risk of a MUAC < 22 cm than did the women aged 25–29 years ($P = 0.002$). Women with ≥ 9 year of formal education had a 53% lower risk of wasting than did women

with 5–8 years of formal education ($P = 0.003$) and a 60% lower risk than did women with no formal education ($P = 0.004$). The inverse association between education and wasting, when measured as either a MUAC < 22 cm or a BMI < 18 kg/m², persisted after adjustments for baseline anthropometry and for other confounders. Women who were better educated could have improved their nutritional and hygienic practices and may be empowered to reallocate limited resources to health care in the event of HIV-related complications. A long-term investment in improving access to formal education is likely to have a positive effect on the nutritional status of populations with a high prevalence of HIV-infection.

Stigma

Certain illnesses have been regarded as shameful and are therefore stigmatized in society (Mwinituo & Mill, 2006). Some of these include HIV, mental illness, tuberculosis, and leprosy. According to the 2008 Ghana Demographic and Health Survey, only 15% of men and 8% of women were found to have accepting attitudes toward people living with HIV (Ghana Statistical Service, 2008a). Such discrimination leads people living with HIV/AIDS (PLWHA) to hide their HIV status, thus reducing their chances of obtaining proper treatment. In Zambia, health services were sometimes denied to HIV-P women (Bond et al., 2002), this typically poses a barrier to good health for HIV-P women (Bond et al., 2002; Raisler & Cohn, 2005). In the face of this stigma, PLWHA are less likely to attend health services, or attend irregularly (Mwinituo & Mill, 2006; Mills, 2006). In addition, in efforts to hide their status, HIV-P individuals sometimes do not provide their complete or real names and addresses; posing difficulties for follow-up. Improving nutritional status thus becomes a challenge when HIV-P individuals fear attending health facilities and seeking care when it is required.

Social capital

Social capital refers to persons' active involvement in various community and social structures that are required to produce some positive outcome (Locher et al., 2004). With respect to nutrition, a series of social acts define an individual's nutritional status and these include obtaining, preparing and eating food. Kawachi and Berkman (2000) stated that social capital within communities affects health by promoting healthy behaviours and discouraging unhealthy ones, by increasing access to health services and amenities, and by enhancing psychosocial processes through the provision of emotional support in trusting social environments.

Evidence of general malnutrition with HIV infection

Among the most common manifestations in patients with HIV infection is weight loss. In Africa, HIV/AIDS was initially known as the "slim disease" because of the classic wasting syndrome typically experienced by HIV-P people (Piwoz & Preble, 2000). Progressive involuntary weight loss typically appears in the early stages of HIV infection and increases in severity as the disease progresses. In 1987, the Centres for Disease Control and Prevention (CDC) included the HIV-wasting syndrome as an AIDS-defining condition (CDC, 1987). It is defined as an involuntary weight loss of > 10% of baseline body weight, with more than 30 days of diarrhoea, weakness or fever. This definition however is challenging when considering that HIV- associated wasting can occur without diarrhoea, fever or weakness. It also does not take into account the rate of weight loss, which may provide valuable information for the assessment of the need for intervention; therefore other criteria for wasting during HIV infection were created by several studies (Wheeler et al., 1998; Wanke et al., 2000; Mangili et al., 2006). Three criteria are now commonly used and these include: (1) unintentional loss of > 10% body weight since study entry, (2) a body mass index (kg/m^2) of < 20, or (3) unintentional loss of > 5% body weight in 6 months (between 2 study visits) that persisted for at least a year. These criteria attempted to include significant

weight loss ($> 10\%$), weight loss that was progressive and advanced ($\text{BMI} < 20$), and a rapid rate of weight loss ($> 5\%$ in 6 months) (Mangili et al., 2006).

In Cote d'Ivoire a cross-sectional study was conducted to evaluate nutritional status and dietary intakes in HIV-outpatients attending the Outpatients and Counselling Unit in the University Hospital in Treichville, Abidjan and in the follow-up unit of Blood Donors. One-hundred HIV-P patients at different stages of the disease were recruited. Sixty-four percent of the study sample were symptomatic patients and had a mean weight, BMI, arm circumference and muscular circumference that was significantly lower than asymptomatic patients ($P < 0.0001$, 0.0001 , 0.0003 and 0.004 respectively) and had suffered a greater weight loss (13.3% vs. 4.2% of actual weight, $P < 0.0001$).

Immunodepressed patients had mean weight; arm circumference and muscular circumference significantly lower than patients with a $\text{CD4 count} \geq 200/\text{mm}^3$ ($P = 0.04$, 0.005 and 0.04 respectively). Weight loss was independent of CD4 count. Protein, carbohydrate and fat intakes were respectively $59 \text{ g}/24 \text{ h}$, $266 \text{ g}/24 \text{ h}$ and $59 \text{ g}/24 \text{ h}$. Energy mean intake was $1800 \text{ kCal}/24 \text{ h}$ and lower than WHO recommended intakes (Castetbon et al., 1997).

Even in the era of highly active antiretroviral therapy (HAART), a cohort study by Wanke et al. (2000) found that out of the 466 HIV-P individuals, 50% of which were on HAART, a total of 156 patients (33.6%) met at least one of the criteria for wasting. Eighteen percent of the patients had lost $> 10\%$ of body weight from baseline, 21% had lost $> 5\%$ of their usual body weight in 6 months (a weight loss that was sustained for ≥ 1 year) and 8% were found to have a body mass index of $< 20 \text{ kg}/\text{m}^2$.

Micronutrient deficiencies are also a common occurrence in HIV infection, especially in the advanced stages of the disease. A recent study by Bilbis et al. (2010) found that HIV-P subjects had significantly lower levels of serum antioxidant vitamins A, C and E ($P < 0.05$). Serum zinc, iron and CD4 count were also significantly lower compared to HIV-N subjects. Serum antioxidant vitamins A, C and E and serum zinc and iron were also shown to be positively

correlated with CD4 count of the HIV-P subjects ($P < 0.05$). In this study, micronutrient deficiencies became more pronounced in HIV-P subjects with CD4 counts less than 200 cell/ μ l and progressive reduction in vitamin E was observed in HIV subjects. Studies have shown that an increased intake of vitamin E decreased the risk of progression to AIDS. Tang et al. (1997) found that HIV-P men receiving the highest quartile of serum vitamin E levels ($\geq 23.5 \mu\text{mol/l}$) showed a 34% decrease in risk of progression to AIDS compared with those in the lowest quartile (hazard ratio = 0.66; 95% confidence interval, 0.41-1.06). Other micronutrients such as vitamins (vitamin A, riboflavin, pyridoxine and cobalamin) and minerals (copper and zinc) were also found to have an association with HIV disease progression if inadequate (Baum et al., 1995; Skurnick et al., 1996). In addition to disease progression, these deficiencies have been shown to be associated with more frequent opportunistic infections and a greater incidence of HIV-related mortality (Tang et al., 1996). For instance, Mocchegiani et al. (1995) found that the frequency of opportunistic infections in the 24 months following the HIV-infected participant's entry into the study was reduced (11 infections vs. 25 in controls) after administering zinc sulphate supplementation. Possible mechanisms include increased intracellular oxygen species that cause oxidative stress, enhanced viral replication, and a reduction in the number of CD4 lymphocytes associated with nutrient deficiencies (Schwarz, 1996).

Evidence of increased mortality related to weight loss during HIV infection

Several studies have shown that individuals with a loss of more than 10% of their body weight have an increased risk of death. Using height and weight loss as predictors of survival, Wheeler et al. (1998) showed an increased risk of death with progressive weight loss. The risk of death rose from 1.26 with a weight loss of 0%–5% over 4 months to 2.22 with a weight loss of 5%–10% also over 4 months. Similarly, Guenter et al. (1993) demonstrated an 8.3-fold increased risk of death with weight $< 90\%$ ideal body weight in HIV-P outpatients. More recently, Thiebaut et al. (2000) demonstrated adjusted survival hazard ratios of 1.9 (95% CI, 1.4–2.6), 3.3 (95% CI, 2.4–4.4), and 6.7

(95% CI, 5.2–8.6) for weight loss of < 5%, 5%–10%, and > 10% from baseline, respectively, over a mean follow-up period of 19.9 months. Furthermore, a low BMI (16–18.4 kg/m²) was associated with a 2.2 (95% CI, 1.6–3.0) increased risk of death, whereas a BMI of < 16 kg/m² was associated with a 4.4-fold (95% CI, 3.1–6.3) increased risk of death (Thiebaut et al., 2000).

Effect of HIV and nutrition in lactating HIV-positive women

In developing countries, HIV-P women are particularly vulnerable to nutrient deficiencies because of inadequate dietary intake associated with food availability, seasonality, and financial viability and increased nutrient requirements associated with HIV infection (Papathakis & Rollins, 2005). Although many of the HIV-P women are of reproductive age, few studies have investigated the relationship between HIV infection during pregnancy or lactation with a focus on maternal nutritional status and health. Furthermore, many women first learn of their HIV status during pregnancy. In Ghana for example, women are counselled on HIV infection during antenatal visits and are offered a free HIV test. In a recent national survey, half (50%) of women 15-49 years of age received HIV counselling during antenatal care for their most recent birth and 28% of these women received the results of their HIV test (Ghana Statistical Service, 2008a). However, the postpartum period is also an important time, especially for HIV-P women because of the risk of weight loss and secondary infections. Women's needs during this period are often eclipsed by the attention that is given to pregnancy and birth (WHO, 1998).

Currently, there are no nutritional recommendations specific for HIV-P breastfeeding women. Lactation increases nutritional demands that may negatively affect maternal health when coupled with the increased physiological demands of HIV infection. Some research suggests that breastfeeding may result in compromised health and lead to increased mortality rates among HIV-P women (Nduati et al., 2001). Nduati and colleagues randomized Kenyan mothers to either breastfeed (n=212) or

formula feed (n=213) for 6 months postpartum. In a post-hoc analysis, the relative risk of death for lactating mothers versus formula feeding mothers was 3.2 (95% CI 1.3-8.1, $P = 0.01$). Eighteen lactating mothers died versus six formula feeding mothers ($P = 0.009$). However, non-randomized trials by Coutoudis and colleagues (2001) and Sedgh and colleagues (2004) found that maternal mortality rates were not significantly different with respect to infant feeding method. Therefore, the WHO concluded that there was not sufficient or reliable evidence that an increase in mortality due to breastfeeding was a risk among HIV-P women. WHO recommends that HIV-P mothers avoid breastfeeding “when replacement milk is acceptable, feasible, affordable, sustainable and safe” (WHO, 2003). However, in many parts of the world, breastfeeding is the social norm for both HIV-P and HIV-N women. In Ghana, for example, breastfeeding is the nearly universal method of infant feeding, regardless of HIV status (Aidam et al., 2005). Therefore, fear of stigma will deter the women from choosing replacement feeding. In addition, keeping in mind that the majority of the people living with HIV/AIDS come from low income countries (UNAIDS, 2010), replacement feeding is likely to be expensive, not feasible and unsafe. Therefore, despite concerns about the HIV transmission risk to the infant from breastfeeding and the possible effect of lactation on the health and nutrition of HIV-P women, breastfeeding will likely remain the norm for HIV-P women in most African countries.

Postpartum weight change

Lactation is often associated with postpartum weight reduction. Body composition changes during the postpartum period are highly varied; most lactating women experience mild, gradual weight loss throughout the first 6 months after delivery (Butte & Hopkinson, 1998). The resulting weight loss in this period may pose a risk to maternal health, particularly for women who began pregnancy with pre-existing malnutrition. There are very few studies investigating postpartum weight change with respect to HIV status. Weight change postpartum can be attributed to many factors and predictors including stage of lactation, gestational weight gain, pre-pregnancy weight, cultural

practice, physical activity and seasonal food availability, with gestational weight gain being the strongest and most consistent predictor. The few studies investigating postpartum weight change with respect to HIV status demonstrate increased weight loss among HIV-P versus HIV-N women. Papathakis and colleagues (2006) found a mean weight loss of 0.34 kg/month for HIV-P women versus a mean weight gain of 0.10 kg/month for HIV-N women with the majority of weight change taking place between 2 and 6 months postpartum. Ladner and colleagues (1998) conducted a prospective study to evaluate the effect of HIV on weight gain in Kigali, Rwanda. Enrolment included 101 HIV-P and 106 HIV-N women between 24 and 28 weeks gestation and follow-up for up to 5 months. After delivery, weight and BMI gains were significantly lower in HIV-P women than HIV-N women ($0.3 \pm 1.5 \text{ kg/m}^2$; $0.8 \pm 1.9 \text{ kg/m}^2$, respectively; $P = 0.03$). Between 10 days and 5 months postpartum, the mean weight variation was $0.7 \pm 3.8 \text{ kg}$ in HIV-P women and $1.9 \pm 4.7 \text{ kg}$ in HIV-N ($P = 0.03$).

In addition to weight loss, HIV-P women often experience micronutrient deficiencies as a consequence of both HIV and lactation. At present, there are no recommendations to ensure the optimal health of HIV-P lactating women. Dewey (2004) noted that lactation increases nutrient demand for vitamin A, vitamin B6, vitamin C, zinc and iodine by more than 50%. Papathakis et al. (2007) found that 33.3% of HIV-P and 8.7% of HIV-N women had anemia ($P = 0.018$). In addition, zinc deficiency, low vitamin B12 and folate concentration were all more prevalent in HIV-P women than HIV-N women ($P < 0.05$). Additional research in this area is necessary to determine how micronutrient status responds to HIV infection combined with lactation. The increased weight loss and risk of micronutrient deficiencies in HIV-P women may have serious consequences in terms of overall health status.

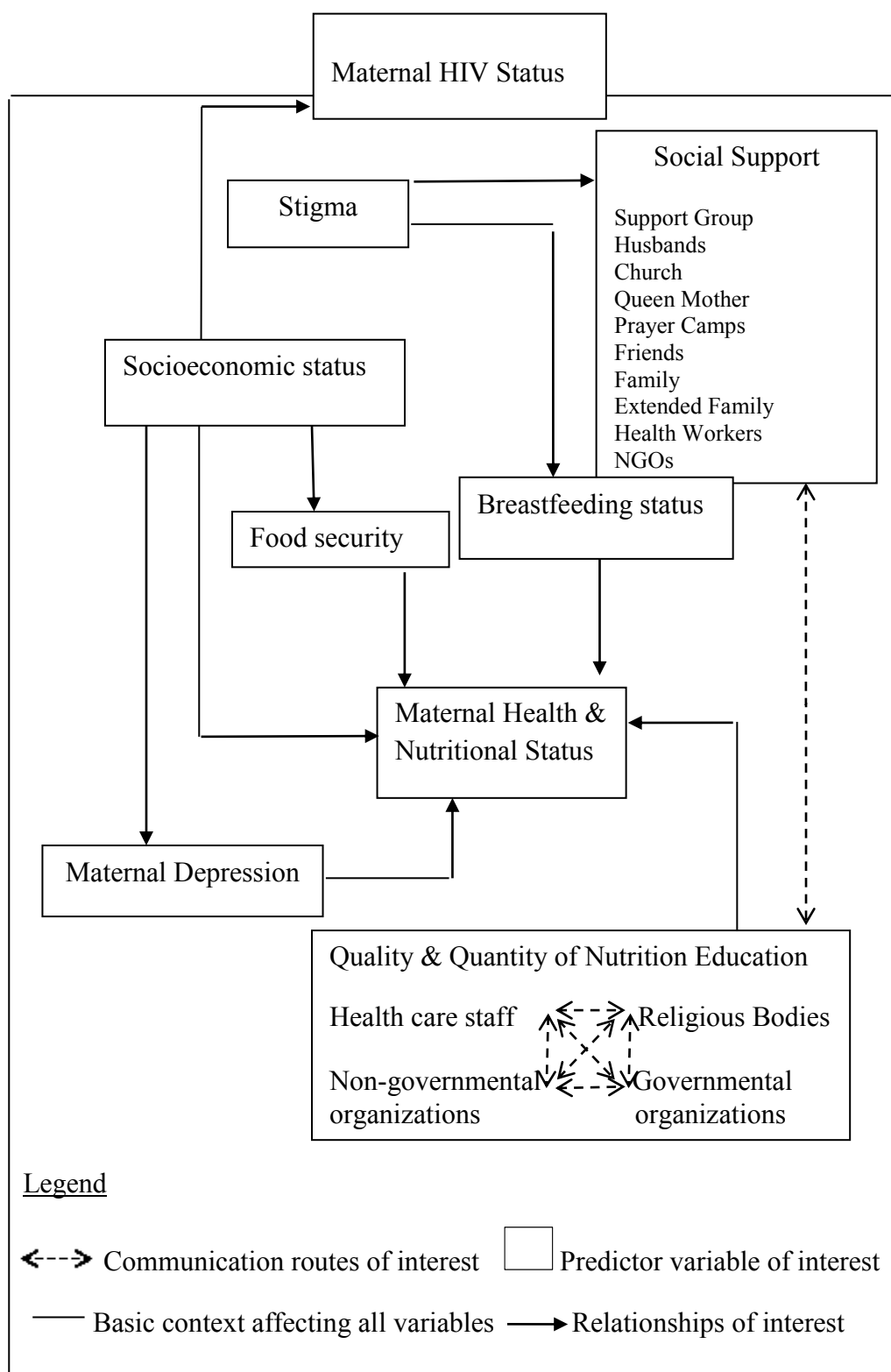
Nutrition education For HIV-positive women in developing countries

Growing recognition of the important role nutrition plays in the care and support of people living with HIV has led to substantial growth in efforts to

integrate food and nutrition interventions into HIV-care and treatment services by governments, donors, non-governmental organizations (NGOs) and community groups. Nutrition education and support may help to break this vicious cycle by helping individuals improve and maintain or slow nutritional status (Piwoz, 2004).

Very few studies in developing countries have examined the important role that nutrition education plays in the management of malnourished HIV-infected patients. More research is needed to better understand this relationship. In South Africa, a pilot study by Niekerk et al. (2000) was conducted to assess the effect of nutritional education and dietary counselling on body weight in patients infected with HIV. Ninety HIV-P patients at a major public teaching hospital in Johannesburg were prospectively enrolled and matched to controls according to age, sex and CD4+ cell count. All the study participants were provided with nutrition education and individualized dietary guidelines, which included principles of healthy economical eating (regular meals; foods from all basic food groups; energy and nutrient dense food), food safety; to decrease the risk of food-borne infections and symptom management. Patients in the control group did not receive nutrition education and dietary counselling. The study resulted in a greater body weight compared to baseline in study subjects than in controls ($P < 0.01$). Weight gain occurred in 53% of counseled patients (mean = 3.5 kg; range = 1-11 kg) versus 21% of matched controls (mean = 2.0 kg; range 1-3 kg) ($P < 0.03$). Nutritional counselling was found to offset the adverse effects of gastrointestinal tract or systemic infection, especially in patients with CD4+ counts < 200 cells mm. In this study the overall body weight change of HIV-N patients who received nutritional education and dietary counselling was significantly greater than in patients who did not receive these interventions.

Figure 2.1. Conceptual framework of the factors affecting women's nutritional status within the context of HIV.



CHAPTER 3: GENERAL METHODOLOGY

The present study consisted of a secondary analysis of quantitative data, as well as the collection and analysis of qualitative data. The quantitative data were collected from 2004 to 2008 as part of the a study entitled Research to Improve Infant Nutrition and Growth (RIING) while the qualitative data collection was conducted from May to September 2010. Hypotheses relating to the quantitative analysis were informed by emerging patterns found in the qualitative data.

Quantitative methods

The RIING project

The following secondary data analysis used part of the data from the Research on Improving Infant Nutrition and Growth (RIING) project. This was a 5-year project (2004-2008) funded by the US National Institutes of Health. The project was an observational, longitudinal cohort study based in the Manya and Yilo Krobo districts in Eastern Ghana (PI: Dr. Grace Marquis). The aim of the RIING project was to identify factors that compromised infant health and care in HIV-affected households.

Study site

Over 2 million people, representing 11.1% of Ghana's population, live in the Eastern region, making it the third most populous region in the country (Ghana Statistical Service, 2008b). Over the years, it has recorded the highest HIV prevalence rates in the country. In 2008, the HIV prevalence was more than twice the national average (4.2% vs. 1.9% respectively) (Ghana AIDS Commission, 2010). Poverty, migration of prostitutes who returned home after being infected in Cote d'Ivoire, and high bride price that promote cohabitation and premarital sex were attributed to the high prevalence rate in the region (Teye, 2005).

There are three major hospitals in the district with programs put in place by the government to prevent mother-to-child transmission of HIV. These strategies included: the provision of voluntary counselling and testing (VCT), linking of family planning with VCT, antiretroviral treatment for patients, antenatal and postnatal care for mothers and infants, counselling for breastfeeding and alternative infant feeding options, and support to carry out infant feeding choices. Women were recruited from the three hospitals in the area and quantitative data were collected in their homes.

Data collection

Inclusion criteria

Pregnant women were recruited at three prenatal clinics in the districts of Yilo and Manya Krobo, in the Eastern region of Ghana; one clinic was in a mission hospital and two were in government hospitals. To be eligible to participate in the RIING study, the women had to be at least 18 years old and pregnant at the time of enrolment. Women who agreed to VCT for HIV also had to agree to have their HIV status released to the project supervisor. Additional criteria included that women were free of AIDS at the time of enrolment, had no condition that might compromise their ability to care for her infant and had agreed to participate for 12 months postpartum. For mothers to continue to participate in the study for postpartum follow-up, they had to give birth to a live infant without birth defects that could hinder growth or breastfeeding. Based on their HIV test results, participants were classified as HIV-P (tested positive for HIV), HIV-N (tested negative for HIV) or unknown HIV status (HIV-U, refused testing for HIV). Only data from HIV-P and HIV-N women for the first 12 months postpartum were used for the following analysis. For compensation, participants received a bar of soap at enrolment. In addition, part of their delivery fee was paid by the project until the free delivery government program was established (\$20 US for normal birth and \$40 US for caesarian section). Ethical approval was obtained from the institutional review boards of McGill University, University of Ghana, Iowa

State University, and University of Connecticut. Signed informed consent was obtained from each participant.

Recruitment

Based on the selection criteria, a hospital staff member informed eligible women about the study after completion of VCT. The study supervisor then enrolled the interested women into the study. The objectives and procedures of the study were explained to eligible participants, and the women were invited to participate. Written informed consent was obtained from the women during the time of enrolment for both themselves and their infant's participation. Women who were not able to sign their name provided a thumbprint. A total of 484 pregnant women were recruited from the antenatal clinics of three community hospitals in the district: St. Martin de Porres Hospital, Atua Government Hospital and the Akuse Government Hospital.

Data collected

Data were collected at multiple time points using pre-tested instruments. Information on infant health and feeding practices were collected along with information on maternal health. Only the information that was used in this thesis is described below.

Socioeconomic and demographic data

Socioeconomic status (SES) and demographic data were collected using structured questionnaires. Information on maternal highest level of education, reported age, ethnicity, primary employment, marital status, and the number of live births was obtained at enrolment. Information on housing characteristics, household size, number of rooms occupied, primary source of water, toilet facility, energy source for lighting and cooking, and household possessions were also collected.

Anthropometry

Maternal anthropometric measurements were taken at 1 month after delivery and then monthly for 12 months. Maternal postpartum weight was measured in kilograms to a precision of 0.1 kg and arm and calf circumference were measured to the nearest 0.1 cm. Height was measured only at 6 months in centimetres to a precision of 0.1 cm.

Morbidity

Mothers were visited at home twice per week to collect information on maternal illness and breastfeeding status. Symptoms of illness included respiratory, gastrointestinal, skin, and reproductive health problems, mouth lesions and nipple lesions. The mother was asked to recall the events for the day of visit and for each preceding day since she was last visited by the field workers for up to 7 days. Therefore, data from day one to 365 days after birth on breastfeeding and illness were available for analysis.

Maternal postnatal depression

Maternal depression was measured at 0 and 6 months postpartum using the Edinburgh Postnatal Depression Scale (EPDS) (Cox et al., 1987). The EPDS is a validated 10-item screening instrument that asks about depressive symptoms that occurred over the past 7 days. The 10-items are scored from 0- 3 with zero indicating absent and three most severe. A cut-off ≥ 13 has been reported to have a sensitivity and specificity of 95% and 93%, respectively, in identifying subjects with major depressive disorders according to the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM-III) (Harris et al., 1989).

Social Capital

Social capital was assessed using a structured questionnaire. This questionnaire probed for the number of social groups the respondent belonged to and the degree of involvement in these activities, the number of close friends and relatives the mother had as well as other families in the neighbourhood to whom she was close. The participants were also asked which relatives, friends or institution were involved in solving major personal problems, giving advice and providing services such as house chores, baby sitting and loaning money. The questionnaire also assessed the changes in the number of friends and quality of friendship over the past year. This questionnaire was administered at enrolment.

Food Security

Food security is defined as having physical and economic access to sufficient, safe, and nutrition foods at all times to meet dietary needs and food preferences for an active and healthy life (Food and Agriculture Organization, 1996); its principal meaning refers to the risk of people being hungry. To determine the state of food insecurity, a set of indicators were used and measured by the RIING Household Food Insecurity Measurement Scale. It included 19 items which were adapted from the United States Department of Agriculture Household Food Security Survey Module (USDA-HFSSM). Fifteen items were from the original USDA-HFSSM, and four items that were added specifically for the RIING study. The questions in the United States Household Food Security Survey Module extract information on whether the household experiences difficulty in meeting basic food needs due to a lack of resources (United States Department of Agriculture, 2006). The RIING Household Food Insecurity Measurement Scale documented maternal experiences and perceptions of household food availability, access and utilization and also coping mechanisms used during times of food scarcity. Eight items specific to addressing adult food security were measured and validated to reflect food security among adults and an adult food insecurity

score was created (Pérez-Escamilla, 2009). Households in this study sample were classified into two categories: secure and insecure.

Statistical Analysis

Dependant variable

For this analysis, we examined the predictors of weight change over the first year postpartum for HIV-P and HIV-N women. The main outcome variable for the analyses presented in this paper is actual change in weight (kg). Weight at 1 month postpartum was the first weight measurement available postpartum. Specific intervals were considered and included in the analyses: between 1 and 3 months, 4 and 6 months, 7 and 9 months, 10 and 12 months, 1 and 6 months, and 1 and 12 months. Weight at the beginning of the specified interval served as the baseline.

Independent variables

Maternal HIV status

Mothers were categorized as being HIV-P and HIV-N. HIV-U was not used in the analyses.

Age

Maternal age, reported in years, was obtained at enrolment and maintained as a continuous variable.

Parity

Information on the number of live births was obtained at enrolment and maintained as a continuous variable.

Ethnicity

Ethnicity was classified into two categories:

- (1) Ga/Adangbe
- (2) Other (Ewe, Akan, northerners and other ethnicity), set as the reference

Maternal Education

The level of maternal education was categorised as none (no formal

education), primary (up to 6 years of basic education) and secondary and higher (> 6 years education).

Marital status

This variable was categorized as: married, unmarried but living with partner, and having no partner (single, separated, divorced). Having no partner was the reference.

Primary occupation

In an open-ended question, the mother was asked to state her primary occupation. The responses were later combined to give two categories:

- (1) Traders (the majority of the mothers were in petty trading)
- (2) Others (included army officer, secretary, teacher, driver, student, baker, caterer, waiter, cleaner, seamstress, hairdresser, farmer, unemployed)

Maternal postnatal depression

The scores to the 10-items were summed up to obtain a total score and a cut-off were employed to classify participants as “depressed” only at 0 months, “depressed” only at 6 months, “depressed” at both 0 and 6 months, and never “depressed”. The term “depressed” in this thesis is used to mean “showing depressive symptoms” to be brief and concise.

Food insecurity

Food insecurity was categorized into two variables

- 1) Food secure (food insecurity score=0)
- 2) Food insecure (food insecurity score= 1-7)

Morbidity variables

All morbidity was standardised to a 100-days by dividing the number of days ill or days breastfeeding by the total number of days observed and multiplying the result by 100. Number of days observed for each interval (for each participant) was calculated as the total number of days in that round that data were collected or recalled. Thus if in one month, data were recalled for only 20 days, then the total number of days observed was calculated as 20.

Prevalence of breastfeeding = # of days of reported breastfeeding / (# of days of the specific interval – # of missing days) * 100

Prevalence of illness = # of days of reported illness / (# of days of the specific interval – # of missing days) *100

Socioeconomic status

The Filmer and Pritchett principal component analysis (PCA) was applied to the socioeconomic indicator variables to obtain initial household SES index that was then used to create a proxy of the individual level SES index (Filmer & Pritchett, 2001). Principal component analysis (PCA) involves a mathematical procedure that transforms a number of possibly correlated variables into a smaller number of uncorrelated variables called principal components. The basic idea in PCA is to find the components s_1, s_2, \dots, s_n so that they explain the maximum amount of variance possible by n linearly transformed components (Sahn & Stifel, 2003; Vyas & Kumaranayake, 2006). The components are ordered so that the first component (PC1) explains the largest possible amount of variation in the original data. Subsequent components are completely uncorrelated with previous components, and explain additional but less variation than the previous component. The higher the degree of correlation between the original variables in the data, the fewer the components required to capture common information. When the PCA method is used in household proxy wealth index construction, it is typically assumed that the first principal component captures enough variability to represent the level of household wealth. Forty-two socioeconomic variables were included in the analysis and these consisted of housing characteristics (e.g., type of walls, roof and flooring), access to utilities (e.g., electricity, toilet facilities and water), and household durable items (e.g., kitchen equipment, electronics, automotive, etc.). These socioeconomic variables were re-coded into binary variables; similar variables with low frequency were combined together and similar variables with high frequency were kept as separate variables. Means and standard deviations were estimated for the distribution of each variable (42 variables) among all households. Using the values from the first principal component (Y_{Ai}); where A_i corresponds to a specific variable, the weight for each variable was estimated by dividing the variable's PCA

value by its standard deviation (Y_{Ai} / σ_{Ai}). Then, an SES index was constructed for each household using the following formula:

$$\text{Household SES Index} = (Y_{A1} / \sigma_{A1}) A1 + (Y_{A2} / \sigma_{A2}) A2 + \dots + (Y_{A42} / \sigma_{A42}) A42$$

Where SES is the composite proxy index of household wealth; Y_{Ai} / σ_{Ai} is weighting score of the i^{th} variable (A); A_i = the i^{th} variable measured as binary variable ($A_i = 0$ or 1). This variable can be used as the household socioeconomic score and the higher the household socioeconomic score the higher the implied SES of that household.

Social capital

Social capital was taken as the number of formal and informal social groups in which a woman had membership.

Analysis

Continuous variables included in the analyses were described using means, medians, and standard deviations. Categorical variables were described using frequencies and percentages. Bivariate analyses examined the differences between the groups (HIV-P and HIV-N women) using independent Student's t-tests and Analysis of Variance (ANOVA) tests for normally distributed continuous variables, and Chi-square (or Fisher's exact test where applicable) for categorical variables. The nonparametric Mann-Witney Wilcoxon Test (equivalent to one-way ANOVA) was used to test for non-normally distributed continuous data. All data were analysed using SAS version 9.2 for Windows (SAS Institute Inc., Version 9.2, 2008). Results were reported at a 0.05 significance level.

Multiple linear regression analysis was used to determine predictors of weight change. The *a priori* conceptual framework (Figure 2.1) guided which variables were tested in the regression model. After running the bivariate analysis, the independent variables found to be statistically significant or approaching significance were tested in the model. These variables, alongside all other variables that had been considered in the *a priori* conceptual framework were entered into the model as well as variables that were believed

to have an effect on the outcome based on the literature. The backward elimination method was used to eliminate non-significant variables and develop a final model. At each step of the model building process, variables with P -values > 0.1 were dropped one at a time until a final model was obtained which retained variables with P -values ≤ 0.1 . In fitting the model for weight change, the predictors occurred before the outcome, in an effort to avoid reverse causality. For example, food security or depression at enrolment predicted the weight change at 3 months and depression at 6 months predicted weight changed at 12 months. All the independent variables were fitted similarly. No outliers were discarded from the analyses.

Participant sample and effect size estimation

Effect size calculations were based on objective 1, which is related to the quantitative data used in this study.

Objective 1: To identify the patterns and predictors of weight change in HIV-P and HIV-N women across the 1st year postpartum in Ghana, using the RIING data set

In the current study, a fixed sample of 314 mothers was available; 147 were HIV-P and 167 were HIV-N. Effect size calculations were made using the following formula (Kelsey, 1996):

$$E = \sqrt{\{(1/q_1 + 1/q_2) S^2 (Z_\alpha + Z_\beta)^2\} / N}$$

Where E = the expected effect size of the outcome variable

q_1 = the proportion of participants in group 1

q_2 = the proportion of participants in group 2

S = the standard deviation of the outcome variable

Z_α = the standard normal deviate for α

Z_β = the standard normal deviate for β

N = the total number of participants

Assumptions: 2-sided test, equal proportions of participants, $Z_\alpha=1.96$, $Z_\beta=0.84$

Desired precision: two-sided alpha (α) of 0.05

Desired power: 0.80, therefore a beta (β) of 0.20

We will be able to detect a mean difference between the two groups of |1.49| Kg with 80% power. The Type I error probability (α) associated with the test of the null hypothesis (that the population means of the two groups are equal) was 0.05.

Qualitative methodology

Research paradigm

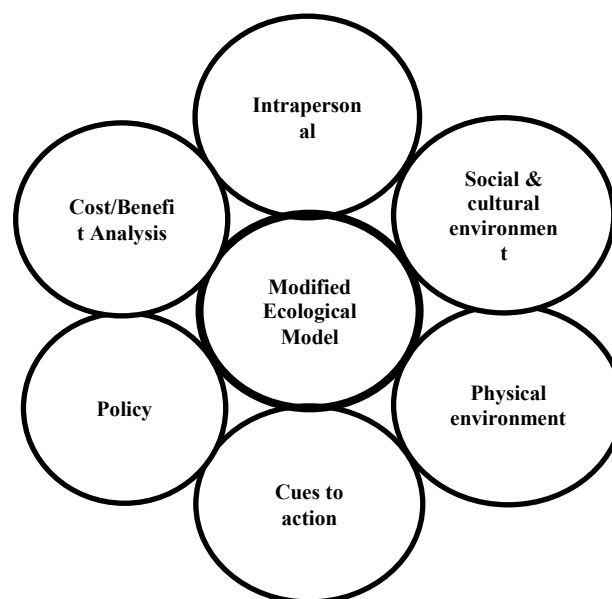
Qualitative research is designed to answer questions about the complex nature of phenomena (Creswell, 1998). It occurs in a natural setting where the researcher is an instrument of data collection gathering words or pictures, analysing them inductively while focusing on the meaning of participants, and describing a process that is expressive and persuasive in language. Its purpose is to describe, explain, and understand the phenomena being researched. The following is a qualitative study that employs qualitative data collection methods, such as, focus group discussions, interviews with key informants, observations and field notes.

Theoretical Framework Guiding the Study

The theoretical framework used in this study is the Modified Ecological Model for Health Behaviour and Health Promotion described by M'Cormack (M'Cormack, 2009). Ecological models suggest that behaviour is influenced by intrapersonal, socio-cultural, and physical environmental variables that interact with each other, and influence health and potential for changing health behaviours (Sallis & Owen, 2002). Multiple interacting dimensions can influence behaviour. Sustained improvements in dietary behaviour often benefit from long-term, repeated exposure to behaviourally focused nutrition education through a variety of channels. Multiple channels of communication,

along with system, environmental, and policy changes may reinforce healthy dietary practices. This study presents a theoretical framework for identifying various factors that influence nutrition education provided to HIV-P women in Ghana. The framework describes individual change within the context of social change, and can assist in the evaluation of multiple-component nutrition education programs. The modified model by M'Comrack depicted below incorporates components of the Health Belief Model (Janz & Becker, 1984), the Ecological Model for Health Related Behaviour (Moos, 1980) and the Ecological Model for Health Promotion (McLeory et al., 1988). This particular model conceptualizes the social world in six spheres, or levels of influence (Figure 3.1). M'Comrack's final model includes: 1) intrapersonal 2) social and cultural environment 3) cues to action 4) physical environment 5) cost/benefit analysis and 6) policy. Also, although nutrition education may ultimately need to be evaluated in terms of the effects of behavioural and dietary change, attention to the effects of nutrition education activities at the system, community, and organizational levels is important because changes at those levels can enable and reinforce changes at the individual level.

Figure 3.1. The Modified Ecological Model for Health Behaviour and Health Promotion representing the six dimensions that influence health behaviour and promotion



Researcher's Position

In qualitative research, quality of the research results is enhanced when the researcher's position is made clear from the onset (Patton, 2002a). This clarity helps the researcher become more aware of his or her potential biases and beliefs that may impact on the way the researcher approaches the study. "Positionality" in this research context is referred to as the way that an individual's position in the social hierarchy compared to other groups potentially "limits or broadens" one's understanding of others. Coming from a constructivist's perspective the researcher acknowledges that her personal background influences the research and positions herself in the study in a way that acknowledges how her background shapes her interpretations. In this study, the researcher locates herself outside the culture in which the research was conducted. She was born and raised in a different country and is not part of the culture or race, therefore there is a sense of detachment, and this is presumed to reduce bias. However, the researcher understands that without empathy and sympathetic introspection derived from personal encounters, human behaviour will not be fully understood and that there is a middle ground between becoming too involved (clouding judgment) and remaining too distant (reducing understanding). The researcher critically reflected on her own assumptions and beliefs, and those of the participants in the research. The researcher kept a reflexive journal during the process to enhance interpretation of the data. Given the differences in culture, native tongue and race, the researcher made a special effort to respect women's perspectives and relate to them in a manner that promoted power sharing to reduce the feeling of intimidation and ambiguity. During data collection, a reciprocal, participatory mode of inquiry was employed. Therefore, instead of being the research subject, the participants in the research setting became "co-investigators", understanding that their contribution to the study may benefit them and that they also had the power to terminate the research at any point.

Qualitative methods

The qualitative data collection period lasted 4 months, from June to September 2010. The data collected included observations in out-patient clinics and HIV-service organizations, focus group discussions with HIV-P women, and individual interviews with health workers, the deputy paramount queen mother, and non-governmental and governmental personnel.

Study site

The study sites were Accra and Manya Krobo, a district in the Greater Accra Region and a district in the Eastern region of Ghana, respectively. The Accra district is the most densely populated part of the Greater Accra Region in part because it contains the city of Accra, the capital of Ghana. Participants recruited in Accra were chosen from HIV-service organizations and Achimota Hospital on the assumption that Accra, the semi-urban district, would have HIV services that are more improved than the HIV services offered in Manya Krobo, a semi-rural district.

The Eastern Region has recorded the highest HIV prevalence rate of 4.2% in 2008 (Ghana AIDS Commission, 2010). The population in this region is underserved, lacking adequate access to resources and health services. The services in Manya Krobo are quite small, with a few doctors who work as the administrative and medical head per hospital. Participants recruited from Manya Krobo were chosen from St. Martin's Catholic Hospital and Atua Government Hospital because they have the most active HIV/VCT program in the region.

Observational data collection

Observations in four out-patient community clinics and three HIV-service organizations in Accra and Manya Krobo were documented with field notes, photographs, and audio recordings. In the out-patient clinics, group health

education talks, vital signs measurements and group HIV counselling sessions were observed. A field assistant, familiar with the local languages, translated the communication among health workers, as well as between the women and the health workers.

Field worker training

In both Accra and Manya Krobo, one field worker was hired. In Accra, the field worker had a Bachelor of Science in Nutrition, and had significant research experience through the university. In Manya Krobo, the field worker had a Senior Secondary School Certificate, and had pertinent work experience in the study sites. Both were familiar with the local community, and fluent in the local languages, *Twi* and *Krobo*, as well as English.

The training format in both sites was similar. The primary researcher led the training. During the first day of training, the research was explained and procedures were reviewed. The training process included sessions on confidentiality, how to obtain consent from the participants, time management, how to use a tape recorder for data collection, and certain skills such as how to be a good interviewer, how to ask interview questions, probe and transcribe audio recordings, how to collect household demographic and socioeconomic information, as well as how the fieldworker should take notes and interpret what he or she heard. During the training sessions, the primary researcher and the field worker engaged in role play and other simulation skits with each other and with members of another research team. Pre-transcribed audio recordings of mock interviews carried out in the local language were played for the field worker to test the accuracy of the transcription.

Focus group discussions and interviews

Two different qualitative methods were used to gather information. These were key informant interviews and focus group discussions (FGD). According to Patton (2002a) key informants are people who are particularly

knowledgeable about the setting and can articulate their knowledge. Individual interviews provide in-depth information about a phenomenon of interest which in the case of this study was the concept of providing nutrition education.

Focus groups provide interactive forums for participants to share their views and listen to and reflect on other participants' views.

FGD were conducted with HIV-P women, and individual semi-structured interviews were conducted with health workers, the deputy paramount queen mother, and non-governmental and governmental personnel involved nutrition education. Details about the procedures for FGD and interviews are shown in Table 3.1.

Recruitment and selection criteria

Initial recruitment of participants was based on purposeful sampling with the intention of information saturation. All the participants were chosen based on their ability to contribute to the building of knowledge and development of theory on the proposed research questions. Rubin & Rubin (2005) suggest that results are more reliable when the researcher finds interviewees with the relevant, firsthand experience.

With the permission and approval of the support group leader and all the members, HIV-P women were recruited by attending support group meetings at out-patient clinics and HIV-service organizations. At the end of the meeting, HIV-P women were asked by the group leader if they would like to participate in the study. Criterion for participation was that they were HIV-P women; they could have been pregnant or lactating. These women were included in the study to allow discussion of previous and current experiences with health services and nutrition education. The expectation was that these HIV-P women had some exposure to nutrition education. Thirty-eight HIV-P women were recruited during the study (13 pregnant, 18 lactating, 7 non-pregnant and non-lactating).

Matrons of the out-patient clinics were asked to identify nurses and other key health workers, involved in nutrition education and support for HIV-P women, who should be invited to participate in the interviews. All of the three nurses, three midwives, three health assistants, and two HIV counsellors, who were invited to participate, accepted. One doctor from one of the out-patient clinics reported being involved in nutrition education and agreed to an interview.

Queen Mothers are the female equivalents of chiefs in the Eastern region of Ghana. These women play a large role in HIV education as well as caring for orphans in the communities. Only one Queen Mother, the Deputy Paramount Queen Mother, involved in HIV education was approached and invited to participate in the research study. Food and Nutrition Technical Assistance II Project (FANTA II), Opportunities Industrialization Center International (OICI), National Association of Positive Persons (NAP+), West Africa AIDS Foundation (WAAF), Women United Against AIDS in Ghana (WUAAG) personnel and employees involved in nutrition education for PLWHA were selected based on referrals from other participants, through snowball sampling. These potential participants were approached and invited to participate in the research study. All five personnel who were invited, one from each of the aforementioned organizations, agreed to an interview. Detailed descriptions of the organizations included in this study are shown in the results section.

Procedures for focus group discussions and interviews

Interview and FGD guides were checked with field assistants, by translating into the local language and then back-translating into English, to ensure accuracy of translation (Jagosh & Boudreau, 2009). Interview guides were pilot-tested during June 2010.

Focus groups were formed with the aim of having 5-8 participants each (Patton, 2002a) and lasted approximately 1 hour. Both the field assistant and the primary researcher took field notes, the latter being on physical settings and the environment. The FGD guide was developed to better understand the

woman's experiences with hospital clinics, and barriers they found in following recommendations with nutritional messages. The questions were open-ended to encourage discussion among the women and to explore any issues further (Krueger, 1998). The women were encouraged to express their own views even if they differed from the view of other participants.

Semi-structured individual interviews with key informants lasted 30 to 60 minutes. Questions addressed the participant's experiences related to providing nutrition education and care to PLWHA. Focus groups and individual interviews were tape-recorded and translated into English, when necessary, by a field assistant. Interviews were then transcribed by the primary investigator and the field assistants. All participation was voluntary. Privacy and confidentiality were encouraged and maintained as much as possible. Informed and written consent for participant involvement, including audio-taping of the interviews, were obtained.

Demographic and other information

Socio-demographic information was obtained from the focus group and interview participants after informed consent was obtained. A questionnaire was used to ask the participants about their age, level of education, employment and other relevant information to help bring context to the study findings.

Analyses of findings

Content analysis was used for analyzing data in this study. The results were analyzed by the primary researcher and organized using Microsoft Word and NVivo version 8.0 (QSR International Pty. Ltd., Version 8, 2008).

Data analysis involved a three-step coding process, namely, the discovery and naming of ideas, identification of themes, and integration of themes (Patton, 2002a; Strauss & Corbin, 1998). The themes generated were then organized

for answering the research questions. The first step in the coding process involved an analytic process through which ideas and concepts expressed by the participants were discovered in the data and labelled. Attention was paid to concepts that were related to the research questions. This was followed by a more thorough re-reading of the transcripts and refining of the labels that were created during the initial reading. This process involved collapsing and renaming ideas and concepts based on their shared characteristics and related meanings (Patton, 2002a). In NVivo, tree nodes were used to link the codes and organize them into main categories and sub-categories. Common issues were noted for their occurrence across participant groups and for the contexts in which they were found (Krueger, 1998; De Negri & Thomas, 2003; Patton, 2002b). The themes identified provided bases for clustering and collapsing codes that conveyed similar concepts or meanings to develop meaningful and coherent themes for interpreting the data. The transcripts from the interviews and FGDs were reviewed several times to clarify understanding of the concepts, identify participant quotes to help illustrate issues, and to elaborate on the contexts of participant responses. The final stage of data analysis involved the integration of themes into a theoretical framework for understanding the concepts from the perspectives of the participants (Patton, 2002a; Strauss & Corbin, 1998). The researcher integrated excerpts from the interview transcripts to illustrate concepts explicitly. Such excerpts from participants were the evidence to support and justify each theme, as well as the overall research findings.

Field notes and pictures¹ of observational data were also analyzed by the primary researcher. The observations were used to identify important issues in nutrition education, to elaborate on and help validate the results from the interviews, and to highlight any disagreements between participant statements and observed practices. The major themes related to nutrition education that are described in the results section were chosen according to the a priori research questions of this study, as well as patterns that emerged from the FGDs, individual interviews and observations.

¹ Pictures of the physical settings, educational material, posters and the health workers were taken. No pictures were taken with any of the HIV-positive women who participated in the

Table 3.1. Procedures for focus group discussions with HIV-P women and interviews with health workers, governmental and non-governmental personnel in Manya Krobo and Accra in Ghana

Participants	(n)	Length (min)	Location ¹	Compensation	Interview Focus
Focus group participants					
HIV-positive women					
Group 1	(6)	90	WAAF/IHCC	Bar of soap, reusable shopping bag	Knowledge on nutrition, dietary practices, and experiences with health services
Group 2	(8)		NAP+		
Group 3	(8)		NAP+		
Group 4	(6)		SMCH		
Group 5	(5)		SMCH		
Group 6	(5)		SMCH		
Interview participants					
Hospital health workers:		30-60	An office at participant's workplace	Bag of rice, bar of soap	Provision of nutrition education
Nurses/midwives	(6)		1 IHCC, 3SMCH, 1 ATUA, 1 ACH		Barriers and facilitators to nutrition education
Health assistants	(3)		IHCC		
HIV counsellor	(2)		IHCC,SMCH		
Doctors	(1)		IHCC		

¹ WAAF= West Africa Aids foundation, IHCC= International Health Care Center, SMCH= St. Martin's Catholic Hospital, ATUA= Atua Government Hospital, ACH= Achimota Hospital, NAP+= National Association of Positive Persons

Table 3.1. Procedures for focus group discussions with HIV-P women and interviews with health workers, governmental and non-governmental personnel in Manya Krobo and Accra in Ghana (cont'd.)

Participants	(n)	Length (min)	Location	Compensation	Interview Focus
Queen Mother ²	(1)	50	Queen Mothers' Association office	None	Nutrition education experiences
Personnel from NGO's ³ :		30-45	Participant's workplace	None	Nutrition education promotion activities
WAAF-Programs Director	(1)				
WUAAG-Accountant Director ⁴	(1)				
NAP+/Model of hope ⁵	(1)				
OICI ⁶	(1)				
			Participant's workplace	None	
Personnel from GO's ⁷ -FANTA II (USAID)-Bilateral ⁸	(1)	30-60			Nutrition education promotion activities Supplementation programs

²Queen mother is the female equivalent of a chief, she plays an important role in orphan care and HIV education; ³NGO= Non-governmental organization; ⁴WUAAG= Women United Against AIDS Ghana
⁵Model of hope is an HIV-positive peer counsellor who serves as a positive role model for other people living with HIV; ⁶OICI= Opportunities Industrialization Center International; ⁷GO= Governmental organization; ⁸FANTA II= Food and Nutrition Technical Assistance Project II, USAID= United States Agency for International Development

CHAPTER 4: MANUSCRIPT 1

HIV-positive Ghanaian women are at increased risk of weight loss during the postpartum period

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ABSTRACT

Background: Weight loss during HIV infection is predictive of hastened disease progression and mortality. Lactation is independently associated with weight loss among women; however, few studies have investigated the effect of maternal HIV infection during the postpartum period when lactation occurs.

Objective: The main objective was to identify predictors of weight change in HIV-positive (HIV-P) and HIV-negative (HIV-N) women in the first year postpartum.

Methods: Quantitative secondary data analysis was performed with data from 314 Ghanaian HIV-P and HIV-N women who were recruited during pregnancy from three hospital-based antenatal clinics and followed for 12 months postpartum. Selected predictors (i.e., demographic, socioeconomic, anthropometric, morbidity) were tested using multiple linear regression.

Results: Between 1-3 months postpartum, HIV-P women gained less weight than HIV-N women (0.05 ± 2.3 kg vs. 0.7 ± 2.4 kg, respectively; $P = 0.03$). The overall effect over one year postpartum was a loss in average weight in HIV-P women and a gain in average weight in HIV-N women (-0.6 ± 4.1 kg vs. 1.1 ± 5.0 kg, respectively; $P = 0.01$). In multiple linear regression, weight change was negatively associated with being HIV-P ($P < 0.0001$), breastfeeding ($P = 0.002$), and being ill ($P = 0.001$). Weight change was positively associated with being a trader ($P = 0.003$). The HIV-breastfeeding interaction was not significant.

Conclusion: Multiple factors affect postpartum maternal weight change. HIV-P women may need individualized nutrition counselling to maintain a normal weight during the postpartum period.

Key words: HIV, nutrition education, health service, Ghana

Introduction

Sub-Saharan Africa (SSA) carries the greatest burden of the HIV/AIDS epidemic, accounting for 67% of all people living with HIV worldwide (UNAIDS, 2010). HIV may affect anyone; however women are disproportionately affected, being twice more likely to become infected with HIV. Reasons for this disproportionate disease burden include an increased biological susceptibility to HIV infection as well as a high vulnerability because of gender inequality, sexual violence, lack of power in sexual relationships, poverty, economic dependence and low education (Raisler & Cohn, 2005). In Ghana, the HIV prevalence ratio for female-to-male is 1.8 to 1 (2.7% vs. 1.5%); which is higher than that found in most population-based studies in Africa (Ghana Statistical Service, 2004).

Although the majority of HIV-positive (HIV-P) women are of reproductive age, the effect of pregnancy or lactation on health and disease progression has received little attention. Increased energy requirements and nutritional demands are required during HIV infection and during lactation (Grinspoon et al., 1998; Butte & King, 2005). Therefore, the combination of HIV infection and lactation may lead to increased risk of maternal nutritional deficiencies if diet is inadequate. In addition, besides increasing energy requirements and the risk of mother-to child transmission (WHO, 2001), lactation can have an adverse effect on HIV-P women (Nduati et al., 2001), yet African mothers often consider the use of replacement milks for infant feeding to be unacceptable, unaffordable, or unsafe (Papathakis & Rollins., 2005; Latham & Preble, 2000). Therefore, because breastfeeding remains the most common form of infant feeding for all mothers in SSA, it is essential to characterize the changes and predictors of nutritional status indicators among HIV-P lactating women (Raisler & Cohn, 2005; Papathakis & Rollins, 2005).

Other factors such as poverty, illness, food insecurity, social capital, and stigma affect many households affected by HIV infection and play a role in predicting the women's nutritional status, psychosocial health, and birth outcomes (Mill, 2003; Haddad & Gillespie, 2001). In the present study,

predictors of postpartum weight change of HIV-P and HIV-negative (HIV-N) women living in a semi-rural community with high breastfeeding prevalence were examined throughout the first year postpartum.

Methods

Study site

This research was conducted in Manya and Yilo Krobo, semi-urban districts in the Eastern Region of Ghana, about 60 km east of the capital, Accra, with a population of about 2, 251, 200 in 2007 (Ghana Statistical Service, 2008b). The Eastern region has the highest HIV prevalence rates in the country. In 2008, the HIV prevalence was more than twice the national average (4.2% vs. 1.9% respectively) (Ghana AIDS Commission, 2010). This secondary data analysis used part of the data from the Research on Improving Infant Nutrition and Growth (RIING) project. The project was an observational, longitudinal cohort study. The aim of the RIING project was to identify factors that compromised infant health and care in HIV-affected households.

Data collection

Inclusion criteria

Pregnant women were recruited at three prenatal clinics in Eastern Ghana, one clinic was in a mission hospital and two were in government hospitals. To be eligible to participate in the RIING study, the women had to be at least 18 years old and pregnant at the time of enrolment. Women, who agreed to voluntary counselling and testing (VCT) for HIV, also had to agree to have their HIV status released to the researchers. Additional criteria included that women were free of AIDS at the time of enrolment, had no condition that might compromise their ability to care for her infant and had agreed to participate for 12 months postpartum. For mothers to continue to participate in the study for postpartum follow-up, they had to give birth to a live infant without birth defects that could hinder growth or breastfeeding.

Based on their HIV test results, participants were classified as HIV-P (tested positive for HIV), HIV-N (tested negative for HIV) or unknown HIV status (HIV-U, refused testing for HIV). Only data from HIV-P and HIV-N women for the first 12 months postpartum were used for this analysis.

For compensation, participants received a bar of soap at enrolment. In addition, part of their delivery fee was paid for by the project until the free delivery government program was established (\$20 US for normal birth and \$40 US for caesarian section). Ethical approval was obtained from the institutional review boards of McGill University, University of Ghana, Iowa State University, and University of Connecticut. Signed informed consent was obtained from each participant.

Data collected

Data were collected at multiple time points using pre-tested instruments. Information on infant health and feeding practices were collected along with information on maternal health.

Variables

The outcome measure of interest was postpartum weight change. Maternal anthropometric measurements were taken at 1 month after delivery and then monthly for 12 months. Maternal postpartum weight was measured in kilograms to a precision of 0.1 kg and arm and calf circumference were measured to the nearest 1 cm. All anthropometric measurements were collected in duplicate and the average values were used for analysis. For the morbidity variables included in the analysis, a pretested semi-structured questionnaire was used to obtain information on maternal self-reported illnesses in the past 2 weeks. The prevalence of illness was calculated as the total number of days ill divided by the number of days observed minus the number of missing/unobserved days for each individual. Symptoms of illness included respiratory, gastrointestinal, skin, and reproductive health problems,

mouth lesions and nipple lesions. The prevalence of breastfeeding was calculated as the total number of days breastfeeding divided by the number of days observed minus the number of missing/unobserved days for each individual. All morbidity statistics were standardised to 100-days. A socioeconomic status index was developed via principal component analysis; a higher index score indicates a higher household socioeconomic status. Social capital was taken as the number of formal and informal social groups in which a woman had membership. Maternal depression was measured at 0 and 6 months postpartum using the Edinburgh Postnatal Depression Scale (EPDS) (Cox et al., 1987). The EPDS is a validated 10-item screening instrument that asks about depressive symptoms that occurred over the past 7 days. The 10-items are scored from 0- 3 with zero indicating absent and three the most severe. A cut-off ≥ 13 has been reported to have a sensitivity and specificity of 95% and 93%, respectively, in identifying subjects with major depressive disorders according to the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM-III) (Harris et al., 1989). The scores to the 10-items were summed up to obtain a total score and a cut-off were employed to classify participants as "depressed" only at 0 months, "depressed" only at 6 months, "depressed" at both 0 and 6 months, and never "depressed". The term "depressed" in this thesis is used to mean "showing depressive symptoms" to be brief and concise. Household food security was measured with a 19-item survey, which was adapted from the United States Department of Agriculture (United States Department of Agriculture, 2006). Fifteen items were from the original USDA-HFSSM, and four items that were added specifically for the RIING study. The modified USDA-HFSSM was called the RIING Household Food Insecurity Measurement Scale. This tool documented maternal experiences and perceptions of household food availability, access and utilization and also coping mechanisms used during times of food scarcity. Eight items specific to addressing adult food security were measured and validated to reflect food security among adults and an adult food insecurity score was created (Pérez-Escamilla, 2009). Households in this study were classified into two categories: secure and insecure.

Analysis

This analysis included 147 HIV-P and 167 HIV-N women who had participated in the RIING study for 12 months postpartum. Three hundred and fourteen women had completed questionnaires on maternal and household demographic and morbidity, 312 completed the questionnaire on socioeconomic characteristics, 260 completed questionnaires on level of social support, 256 and 269 had completed data on household food security at enrolment and at 6 months respectively, and 246 had completed questionnaires on maternal depression.

Weight change was examined at 1-3, 4-6 and 9-7, 10-12, 1-6 and 1-12 month intervals. Continuous variables included in the analyses were described using means, medians, and standard deviations. Categorical variables were described using frequencies and percentages. Bivariate analysis examined the differences between the groups (HIV-P and HIV-N women) using independent Student's t-tests and Analysis of Variance (ANOVA) tests for normally distributed continuous variables, and Chi-square (or Fisher's exact test where applicable) for categorical variables. The nonparametric Mann-Witney Wilcoxon Test (equivalent to one-way ANOVA) was used to test for non-normally distributed continuous data. Then, multiple linear regression analysis was used to build a model for postpartum weight change on the predictor variables that were statistically significant in the bivariate analyses or were in an *a priori* conceptual framework (Figure 2.1) based on the literature. The backward elimination method was used to eliminate non-significant variables and develop a final model. At each step of the model building process, variables with P -values > 0.1 were dropped one at a time till a final model was obtained which retained variables with P -values ≤ 0.1 . In fitting the model for postpartum weight change, the predictors occurred before the outcome, in an effort to avoid reverse causality. For example, food security or depression at enrolment predicted the weight change at 3 months and depression 6 months predicted weight changed at 12 months. All the independent variables were fitted similarly. No outliers were discarded from the analyses. All data were

analysed using SAS version 9.2 for Windows (SAS Institute Inc., Version 9.2, 2008). Results were reported at a 0.05 significance level.

Results

Study population

For the present study, 314 women who were either HIV-P (n=147) or HIV-N (n=167) were included in the analysis. Maternal age ranged from 18 to 48 years (Table 4.1). Parity was at a maximum of eight live births. The Ga-Adangme ethnic group, indigenous to the region, dominated all other ethnic groups. Twelve percent of women had no formal schooling, and about one third did not reach secondary school. HIV-P women were more likely to have lower education, lower socioeconomic status, and were more likely to be unmarried and living with a partner.

Anthropometric variables

At every month during the first year postpartum, the average maternal weight was significantly different between HIV-P and HIV-N women (Figure 4.1). Average maternal weight at month 1 was 57.3 ± 10.4 kg for HIV-P and 63.9 ± 11.5 kg for HIV-N women ($P < 0.0001$). Maternal height at 6 months postpartum was not significantly different with respect to HIV status (Table 4.2).

At 1 month postpartum, 40 (27.2%) HIV-P women had mid-upper arm circumference (MUAC) measurements of < 23 cm (fifth percentile of US National Health and Nutrition Examination Survey) (Papathakis et al., 2006). At 6 months, this number increased by 10 for HIV-P women and at 12 months, 60 HIV-P women had an MUAC of < 23 cm, showing a linear increase in the number of women who are becoming malnourished throughout the first year postpartum. For HIV-N women, their numbers stayed fairly stable with 19 women at 1 month, 19 at 6 months and 23 at 12 months with MUAC < 23 cm.

In both HIV-P and HIV-N women, the change in weight was significantly correlated with the change in MUAC ($r = 0.80$, $P < 0.001$; $r = 0.75$, $P < 0.001$, respectively) and calf circumference ($r = 0.61$, $P < 0.001$; $r = 0.46$, $P < 0.001$, respectively).

At baseline (month 1), 7.8% of HIV-P women and 0% of HIV-N were underweight ($\text{BMI} \leq 18.5 \text{ kg/m}^2$). Sixty-six percent of HIV-P and 56.3% of HIV-N women were of normal weight (BMI between 18.5 and 25 kg/m^2), and 26.5% of HIV-P and 43.7% of HIV-N women were overweight ($\text{BMI} \geq 25 \text{ kg/m}^2$). At 12 months postpartum, the percentage of underweight was 10.6% in HIV-P women but only 0.8% of HIV-N women. Sixty-one percent of HIV-P women and 49.6% of HIV-N women were of normal weight and 28.2% of HIV-P and 49.7% of HIV-N were overweight at the final measurement.

Throughout the first 12 months postpartum, 52.7% of women lost weight and 47.3% of women gained weight. Among HIV-P women, 58.3% lost weight; whereas among HIV-N women 49.5% lost weight. Overall, HIV-P mothers lost an average of $0.56 \pm 4.2 \text{ kg}$ whereas HIV-N mothers gained an average of $1.1 \pm 5.0 \text{ kg}$ in the first year postpartum, this difference was statistically significant ($P = 0.01$) (Table 4.3). The range of maternal weight change in HIV-N women was between -8.4 kg and +12.8 kg; the distribution was positively skewed leaning more towards a weight gain than weight loss, while the range for HIV-P women was between -10.1 kg and +11.4 kg, the distribution showing a tendency to weight loss vs. weight gain.

Breastfeeding practices

Breastfeeding was highly prevalent among study participants; 85.6% exclusively breastfed for 6 months postpartum. Only 8 mothers (2.5%) in the sample never breastfed; all of these women were HIV-P. Exclusive breastfeeding was lower in HIV-P compared to HIV-N women at 6 months (78.9% vs. 91.6%, $P < 0.01$). The prevalence of breastfeeding at any time in the first year postpartum was significantly different by HIV status (Table 4.4).

Maternal illness

During the 1st year postpartum, reported illness symptoms were not different between groups and were generally low (Table 4.5). Overall, maternal illness decreased throughout 12 months postpartum. The most common specified symptom experienced by the participants was reproductive dysfunction, occurring in 14.9% of the study participants. The most common specified symptom of HIV-P participants was respiratory tract infection (12.8%).

Maternal depression

Depressive symptoms (as identified by an EPDS score ≥ 13) were noted among 22% of HIV-P women and 24% of HIV-N women at 0 months postpartum, this difference was not statistically significant ($P = 0.76$) (Table 4.6). At 6 months postpartum, there was also no statistically significant difference among HIV-P and HIV-N women showing depressive symptoms ($P = 0.22$).

Food Security

At 12 months, food insecurity was found among 24% of the study participants (Table 4.7). Food insecurity was experienced by 29% of HIV-P and 20% of HIV-N participants. Severe food insecurity was more than twice as high among HIV-P vs. HIV-N participants (16.8% vs. 7.7%, $P = 0.03$, respectively) at 6 months and four times as high at 12 months (18.6% vs. 4.7%, $P < 0.0001$, respectively). Mean maternal weight change was significantly different among food secure versus food insecure participants at 12 months postpartum (0.47 kg vs. 0.36 kg, respectively; $P = 0.032$), but not at 6 months postpartum (1.12 vs. 0.63 kg, respectively; $P = 0.74$).

Independent predictors of postpartum weight change: results of multiple linear regression

In this study, we found that 12 months postpartum, HIV-P Ghanaian women, 87% of whom were breastfeeding, on average lost weight, whereas the HIV-N women gained weight. Reported illness (respiratory, gastrointestinal, skin, mouth/nipple lesions or reproductive illness) was the strongest predictor of weight change postpartum. Other predictors included HIV status, breastfeeding, SES, and working as a trader (Table 4.8). HIV status was found to be negatively associated with a postpartum weight change. To understand the degree to which HIV was associated with weight change from 10-12 months postpartum, we estimated the difference between two individuals who had all the same characteristics (e.g., a median prevalence of illness of 7%, a median social capital of 2 groups, and a median parity of 2 births) except HIV status (Table 4.9). We found that being an HIV-P woman was significantly associated with an estimated -3.4 kg change in postpartum weight, independent of other risk factors. A higher prevalence of breastfeeding and illness was also found to be negatively associated with weight change, while SES and working as a trader were significantly positively associated with weight change during the 12 months postpartum. Multiple linear regression was also performed at different month intervals in the first year postpartum (e.g., 1-3 months, 4-6 months, 9-7 months, and 10-12 months), and we found that different variables were significant at different time points (Table 4.9). These variables, however, represent similar constructs that maternal health (BMI, HIV status, illness), physiological state (breastfeeding), and socioeconomic status (occupation, SES index) are predictors of the weight change seen in the postpartum period. In addition, the effect of HIV was shown to be modulated by other related factors such as illness, depression, social capital, food insecurity and parity during the first year postpartum.

Discussion

Knowledge of the possible factors that may affect or predict postpartum weight change is essential as weight loss in HIV patients is related to increased disease progression and increased risk of mortality (Grinspoon and Mulligan, 2003; Malvy et al., 2001, Mangili et al., 2006). In addition, breastfeeding has been associated with increased weight loss in the postpartum period (Baker et al., 2008, Dewey et al., 2004) and studies have suggested that breastfeeding can have a deleterious effect on HIV-P women, increasing the risk of mortality (Nduati et al., 2001). To our knowledge, this study is the first to report postpartum weight change in relation to maternal HIV status among Ghanaian lactating women.

Our finding of weight loss in HIV-P mothers was similar to a study of body weight in HIV-P and HIV-N South African mothers (Papathakis et al., 2006), which found that HIV-P mothers lost weight while HIV-N mothers gained weight between 8 to 24 weeks postpartum (-1.4 ± 3.1 kg in HIV-P mothers and 0.4 ± 3.3 kg in HIV-N mothers; $P = 0.004$). Although this period of follow-up was slightly different, if we take the same interval from 8 to 24 weeks in our study, the HIV-P mothers lost 0.3 ± 2.8 kg, whereas the HIV-N mothers gained 1.2 ± 3.0 kg ($P < 0.0001$). Our Ghanaian HIV-N women gain 210% more than their South African peers. Additional research by Papathakis et al. (2004) found that HIV-P lactating women lost an average of -1.41 ± 3.1 kg while HIV-N lactating women gained an average $+0.27 \pm 3.33$ kg throughout 6 months postpartum ($P = 0.006$).

For our HIV-N Ghanaian women, the weight change patterns observed did not follow the expected gradual losses in weight across the first year postpartum. HIV-N women on average gained weight. Net gains at 12 months averaged 1.1 kg. What is important to note here is that, if the pattern of postpartum weight change for HIV-P Ghanaian women was compared to other countries' weight change patterns; a loss of weight postpartum would seem normal, however, in comparison to HIV-N Ghanaian women living under similar conditions and

coming from the same background, it can be seen that trends of postpartum weight change significantly differ. Maternal food intake and physical activity data were not collected in this study, but cultural practices in Ghana might explain the patterns observed in HIV-N women. In a study by Onyango et al. (2011), Ghanaian women were also shown to experience a weight gain postpartum, in contrast to the weight loss patterns seen in other countries. These researchers attributed this phenomenon to the cultural practices of care for the new mother that exist in Ghana. The study stated that a close relative usually takes over the household chores of the newly delivered woman and the new mother receives special care and special diets of rich soups and sauces with herbs believed to enhance breast milk production. In this period, mothers do not make any conscious effort to lose weight or engage in physical activity. Alternatively, as breastfeeding stimulates appetite, breastfeeding women, particularly in Ghana, may have failed to mobilize the fat stores accumulated during pregnancy and/or gained new weight in the postpartum period.

Nduati et al. (2001) suggested that weight loss associated with breastfeeding might be more severe in HIV-P women than in healthy women. In a randomized clinical trial of formula feeding versus breastfeeding in Kenyan HIV-P mothers, baseline weight measured between 0.5 and 3 months postpartum was compared with weight measured between 5 and 9 months postpartum. Formula feeding mothers lost no weight, whereas breastfeeding mothers lost 0.17 kg/mo ($P = 0.03$). The sample in this study fostered a 'pro-breastfeeding culture' which is typical in Ghana, resulting in high prevalence rates of breastfeeding (HIV-P women: 92% at months 1, 89% at month 6 and 87% month 12; HIV-N women: 99% at month 1, 6 and 12). The postpartum period from 3-6 months, when rates of breastfeeding are presumably the highest; breastfeeding was reported to have the strongest association with postpartum weight loss (Dewey et al., 2004). However, in our study, maternal weight change did not differ significantly by prevalence of breastfeeding during the first 6 months postpartum nor was the HIV-breastfeeding interaction significant. Breastfeeding was only significantly negatively associated with weight change from 10-12 months postpartum and 1- 12

months postpartum. It is likely that that HIV status had a more sizable effect on weight change than other predictors during the early postpartum period where exclusive breastfeeding rates are at their highest.

A mean 0.56 kg weight loss between 1 and 12 months postpartum in HIV-P women in the present study represents a theoretic total deficit of approximately 4,420 kcal over 112 days (or a daily deficit of approximately 12 kcal). This theoretic deficit represents 0.7% of the calculated resting energy expenditure (1705 kcal) based on the mean height, weight, and age of the HIV-P women in our study (Harris, 1919). In a study of 33 HIV-P non-breastfeeding women, Grinspoon et al. (1998) found that the resting energy expenditure was higher ($119\% \pm 23\%$) than in 26 HIV-N weight matched control women. In our study, we are unable to determine if the weight loss observed was attributable to decreased energy intake, malabsorption, increased physical activity, or energy expenditure associated with HIV, or a combination of these factors. Although the energy deficit that we found in our study is low (12 kcal/d, from 1 to 12 months) compared to other studies (96 kcal/d, from 8 to 24 weeks); (Papathakis et al., 2006), it is noteworthy to consider potential mechanisms that may have buffered the effect of HIV status on postpartum weight. In addition, although this study found increased weight loss in HIV-P women, there was no evidence of a higher risk of illness with respect to increased weight loss or HIV status. Some studies suggest that in underweight women weight changes are buffered or controlled by the body. Winkvist et al. (1994) found that severely malnourished women gained a mean of 4.5 ± 5.7 kg throughout one reproductive cycle (i.e., pregnancy, full breastfeeding and overlap of breastfeeding with next pregnancy). It was concluded that there was a buffering mechanism for underweight women that prevented extreme weight loss. That is, if dietary intake is inadequate and cannot be increased to sustain weight, then the body adjusts and adapts to the physiological state that it is in by using the mother's own energy reserves (Nduati et al., 2001).

Like most of the African economies, the Ghanaian economy is divided into formal and informal sectors. The formal sector employs about 14% of the labour force aged between 15 and 64 years and the informal sector (including petty trading) is the source of livelihood for the remaining 86% of the working age population (Trades Union Congress, 2004). Fifty percent of the study sample were traders, 9% were unemployed and 41% were employed in other informal and formal jobs. Seamstress and a hairdresser were second and third to being a trader. As an occupation, trading is the most important non-farm activity and an occupation that dominates most peri-urban economies of Africa (Little, 2000). The results of the current study showed that traders were more able to gain weight postpartum than women who were unemployed or had any other job. Ene-Obong et al., 2001 found that HIV-N Nigerian teachers had significantly ($P < 0.05$) better health status, health and nutrition knowledge, food habits, nutrient intake, and self-concept, and adhered less to detrimental cultural practices. More cases of chronic energy deficiency (muscle wasting) were observed among the farmers (16%) and traders (14%) than among the teachers (6%). In this study sample, there were only 7 teachers out of the 314 Ghanaian women; however, the studies can be compared in that they both show that the type of occupation reflects economic status, therefore in this study, our assumption is that traders were able to make more money, and thus have more food to maintain their body weight.

The current reality of HIV-P lactating Ghanaian women is that they are at risk of increased weight loss during the postpartum period. Attention and assistance needs to be given to this population to improve their nutritional status. Nutrition education may be an effective first-line intervention for malnourished HIV-P women and may help to prevent or reduce weight loss during the postpartum period. To ensure effective nutrition education delivery, it should be directed at the prevention or cause of malnutrition. The predictors of postpartum weight change found in this study may be useful in directing proper nutrition counselling for HIV-P lactating Ghanaian women. Accordingly, health care providers in HIV-affected communities should have a thorough knowledge of local resources and infrastructure to optimize the

quality and content of nutrition education offered to HIV-P lactating woman, keeping in mind that their recommendations should be available, affordable and practical.

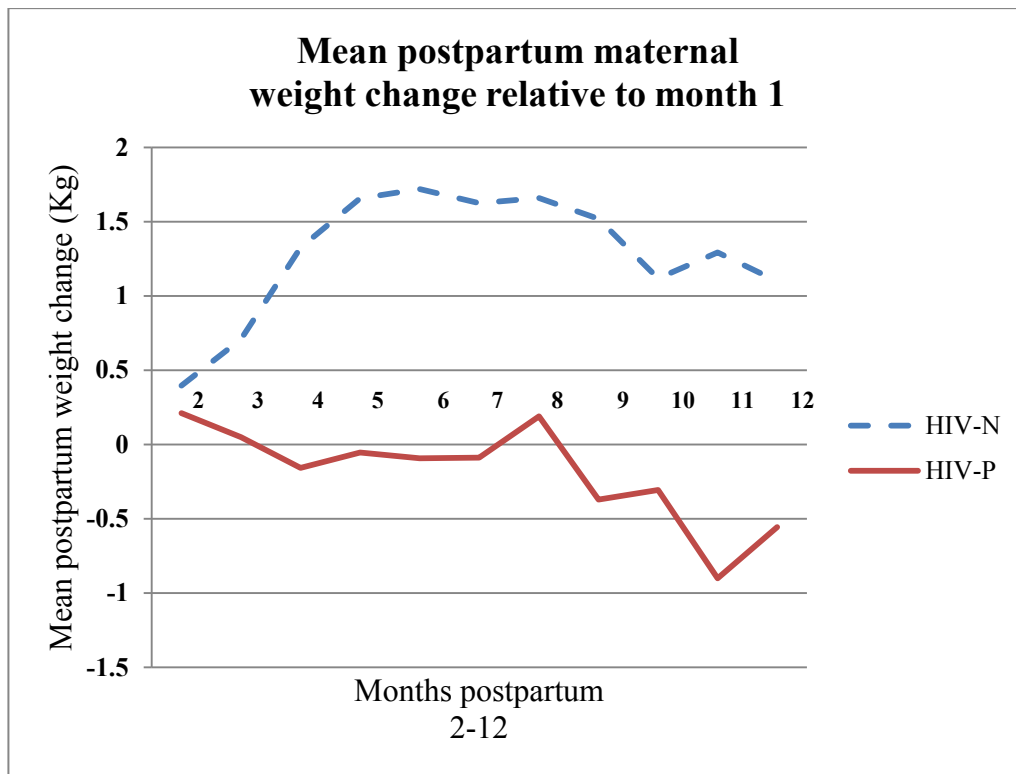


Figure 4.1. Mean postpartum maternal weight change relative to month 1 in HIV-positive and HIV-negative Ghanaian women.

Range = -0.9 to 0.2 kg for HIV-positive women; and 0.4 to 2.7 kg for HIV-negative women. At every month, the mean weight was significantly different between HIV-P and HIV-N women.

Table 4.1. Baseline demographic characteristics and socioeconomic status of 314 Ghanaian women by HIV status¹

Variable	Whole sample n=314		HIV-P ² n=147		HIV-N n=167		P-value ³
Maternal age (y)	28.6	± 5.9	28.2	± 5.8	28.9	± 6	0.282
Parity (#)	1.6	± 1.5	1.5	± 1.5	1.6	± 1.5	0.652
Socioeconomic status ⁴	3.2	± 2.8	2.4	± 2.6	3.9	± 2.7	<0.0001
Maternal education ⁵							0.0001
None	36	(11.5)	25	(17.0)	11	(6.6)	
Primary	72	(22.9)	43	(29.3)	29	(17.4)	
Secondary & higher	206	(65.6)	79	(53.7)	122	(76.0)	
Ethnicity							<0.0001
Ga/Adangbe	227	(72.3)	122	(83.0)	105	(62.9)	
Other ⁶	87	(27.7)	25	(17.0)	62	(37.1)	
Primary occupation							0.716
Unemployed	28	(8.9)	12	(8.2)	16	(9.6)	
Trader	157	(50.0)	77	(52.4)	80	(47.9)	
Other ⁷	129	(41.1)	58	(39.4)	71	(42.5)	
Marital status							<0.0001
Married	97	(30.9)	23	(15.7)	74	(44.3)	
Unmarried, living with partner	154	(49.0)	83	(56.5)	71	(42.5)	
Other ⁸	63	(20.1)	41	(27.8)	22	(13.2)	

¹ Data represent mean ± SD or n (%); ² HIV status: HIV positive (HIV-P); HIV negative (HIV-N); ³ (Student's t-test, Chi-square)

⁴ SES= Socioeconomic status; an index was created using principal component analysis (Range= -2 to +12; a higher index score indicates a higher household SES); ⁵ Level or school started but not necessarily finished; ⁶ Ewe, Akan, northerner, and any other ethnic groups; ⁷ Seamstress, caterer, secretary, hairdresser, teacher, baker; student, driver, army officer, waiter, cleaner, farmer. ⁸ Single, separated or divorced

Table 4.2. Mean anthropometric indicators at 6 different intervals in 314 Ghanaian women by HIV status

Variable	Months postpartum	HIV-P ¹ n=147			HIV-N n=167			<i>P</i> -value ²
		Mean	±	SD	Mean	±	SD	
Height at 6 mo (cm)		158.5	±	5.1	158.7	±	5.7	0.15
BMI(kg/m ²) ³								
	1-3	23.36	±	3.74	25.50	±	4.29	0.0001
	4-6	23.02	±	4.18	25.96	±	4.57	<0.0001
	7-9	23.11	±	4.11	25.85	±	4.72	<0.0001
	10-12	22.97	±	4.46	25.80	±	5.01	<0.0001
	1-6	23.33	±	3.96	25.82	±	4.57	0.0002
	1-12	22.62	±	3.51	26.06	±	5.03	<0.0001
Arm circumference (cm)								
	1-3	27.08	±	3.50	28.90	±	3.82	0.0002
	4-6	27.26	±	3.84	29.94	±	4.17	<0.0001
	7-9	27.60	±	4.04	29.90	±	4.24	0.0002
	10-12	27.32	±	4.13	29.77	±	4.52	0.0001
	1-6	27.23	±	3.45	29.61	±	4.10	<0.0001
	1-12	26.94	±	3.38	29.85	±	4.41	0.0003
Calf circumference (cm)								
	1-3	32.24	±	3.22	33.68	±	3.10	0.0007
	4-6	32.07	±	2.99	34.04	±	2.99	<0.0001
	7-9	32.49	±	3.34	34.09	±	3.33	0.0012
	10-12	32.39	±	3.48	34.19	±	3.17	0.0004
	1-6	32.24	±	2.94	33.99	±	3.04	0.0003
	1-12	32.14	±	2.91	34.31	±	3.19	0.0007

¹HIV status: HIV positive (HIV-P); HIV negative (HIV-N)

²Student's t-test was used to test group differences

³BMI= Body Mass Index = body weight in kilograms/height in meters squared

Table 4.3. Mean change in anthropometric indicators at 6 different intervals in 314 Ghanaian women by HIV status

Variable	Months postpartum	HIV-P ¹ n=147			HIV-N n=167			
		Mean	±	SD	Mean	±	SD	<i>P</i> -value ²
Weight change (kg)								
	1-3	0.05	±	2.27	0.71	±	2.40	0.0450
	4-6	-0.17	±	1.80	0.27	±	1.97	0.0546
	7-9	-0.47	±	1.88	-0.12	±	1.72	0.26
	10-12	-0.34	±	2.09	-0.30	±	1.84	0.83
	1-6	-0.09	±	3.39	1.7	±	3.86	0.0004
	1-12	-0.56	±	4.16	1.10	±	4.97	0.0171
Change in BMI (kg/m ²) ³								
	1-3	0.05	±	0.8	0.3	±	0.9	0.0482
	4-6	-0.07	±	0.7	0.1	±	0.8	0.0426
	7-9	-0.19	±	0.8	-0.05	±	0.7	0.24
	10-12	-0.1	±	0.8	-0.1	±	0.7	0.81
	1-6	-0.03	±	1.3	0.7	±	1.5	0.0004
	1-12	-0.2	±	1.6	0.5	±	2.0	0.0203
Change in arm circumference (cm)								
	1-3	0.7	±	1.2	1.02	±	1.09	0.0241
	4-6	0.03	±	1.0	0.3	±	1.0	0.0468
	7-9	-0.03	±	1.1	-0.02	±	0.9	0.57
	10-12	-0.1	±	1.1	-0.09	±	0.9	0.45
	1-6	0.8	±	1.5	1.8	±	1.6	<0.0001
	1-12	0.6	±	1.8	1.6	±	2.0	0.0002
Change in calf circumference (cm)								
	1-3	0.3	±	0.9	0.3	±	1.0	0.93
	4-6	0.1	±	0.8	0.2	±	0.9	0.73
	7-9	-0.08	±	0.9	0.2	±	1.0	0.099
	10-12	0.03	±	1.0	-0.03	±	0.9	0.81
	1-6	0.6	±	1.3	0.7	±	1.3	0.76
	1-12	0.7	±	1.4	0.7	±	1.4	0.89

¹HIV status :HIV positive (HIV-P); HIV negative (HIV-N)

² Difference were tested with the Mann-Witney Wilcoxon test; a test used for non-normally distributed continuous data

³BMI= Body Mass Index = body weight in kilograms/height in meters squared

Table 4.4. Prevalence of breastfeeding in 314 Ghanaian women by HIV status¹

Months postpartum	HIV-P (n=147)	HIV-N (n=167)	P-value ²
1-3	92.56	99.59	0.0233
4-6	90.43	99.88	<0.0001
	82.1		
7-9	2	99.45	<0.0001
10-12	78.12	99.36	<0.0001
1-6	91.53	99.73	0.0007
1-12	86.35	99.57	<0.0001

¹ Prevalence= % of observed breastfeeding days / (# of total days - # of not observed or missing days)

² Difference were tested with the Mann-Witney Wilcoxon test; a test used for non-normally distributed continuous data

Table 4.5. Prevalence of illness in 314 Ghanaian women by HIV status¹

Months postpartum	HIV-P (n=147)	HIV-N (n=167)	P-value ²
1-3	19.36	16.65	0.96
4-6	12.09	11.39	0.29
7-9	13.90	9.22	0.57
10-12	12.05	10.10	0.56
1-6	15.84	14.03	0.84
1-12	14.55	11.85	0.65

¹ Prevalence= % of observed ill days / (# of total days - # of not observed or missing days)

² Difference were tested with the Mann-Witney Wilcoxon test; a test used for non-normally distributed continuous data

Table 4.6. Reported maternal postnatal depression at 0 and 6 months in Ghanaian women by HIV status¹

Variable	Whole sample n=246	HIV-P ² n=100	HIV-N n=146	P- value ³
Depressed at ⁴				
Only 0 months	57 (23.2)	22 (22.0)	35 (24.0)	0.76
Only 6 months	27 (11.0)	14 (14.0)	13 (8.9)	0.22
Both 0 and 6 months	79 (32.1)	35 (35.0)	44 (30.1)	0.78
None	83 (33.7)	29 (29.0)	54 (37.0)	0.41

¹Data represent n (%)

²HIV status: HIV positive (HIV-P); HIV negative (HIV-N)

³Fisher's Exact Test was used on categorical variables to test group differences

⁴Depression was measured using the Edinburgh Postnatal Depression Scale (Cox et al., 1987). Women who scored 13 and above were classified as showing depressive symptoms ("depressed")

Table 4.7. Household food security as reported by Ghanaian women at 0, 6 and 12 months by HIV status¹

Variable	Whole sample n=256/269/252 ³	HIV-P ² n=122/113/102	HIV-N n=134/156/150	P- value ⁴
Food security at 0 months ⁵				
Insecure	96 (37.5)	48 (39.3)	48 (35.8)	0.46
Secure	160 (62.5)	74 (60.7)	86 (64.2)	0.61
Food security at 6 months				
Insecure	76 (28.3)	36 (31.9)	52 (25.7)	0.03
Secure	193 (71.8)	77 (68.1)	116 (74.4)	0.28
Food security at 12 months				
Insecure	60 (23.8)	30 (29.4)	30 (20.0)	0.13
Secure	192 (76.2)	72 (70.6)	120 (80.0)	0.10

¹Data represent n (%)

²HIV status: HIV positive (HIV-P); HIV negative (HIV-N)

³n= #study participants at 0 months/at 6 months/at 12 months

⁴Fisher's Exact Test was used on categorical variables to test group differences

⁵Food security was measured using the USDA-HFSSM. Households were classified into two categories: secure and insecure (Food secure was assigned to women who scored 0 on the USDA- Household Food Security Survey Model (HFSSM) (USDA, 2006). Households were classified into two categories: secure and insecure (Food secure was assigned to women who scored 0 on the HFSSM. Food insecure was assigned to women who scored 1-7 on the HFSSM).

Table 4.8. Predictor variables for the change in postpartum weight among Ghanaian women used in multiple linear regression

Demographic variables:	Household socioeconomic status (SES index)
HIV status	Morbidity variables:
Maternal education	BF days observed (%)
Age (y)	Ill days observed (%)
Ethnicity	Depression :
Marital status	At only 0 months, at only 6 months, at both, never
Parity (#)	
Occupation	Food security:
	0=secure, 1=insecure
Social support (#)	

Variables in Table 4.8 were put in the models tested. In each model, interaction terms such as HIV status and depression, HIV status and illness, HIV status and breastfeeding, HIV status and food insecurity, and HIV status and social support were also tested. The method of backward elimination was used to eliminate non-significant variables one at a time until a final model was obtained which consisted of variables with a P -value ≤ 0.05 . In fitting the model for each interval, we ensured that the predictors occurred before the outcome. For instance, food security collected at 0 and at 6 months predicted postpartum weight change in the 4-6 and 10-12 mo period, respectively.

Table 4.9. Multiple linear regression: Variables associated with postpartum weight change (kg) at 3 month intervals in 314 Ghanaian women.

Predictor variables	1-3 ¹			4-6 ²			7-9 ³			10-12 ⁴		
	β	SE	P-value ⁵	B	SE	P-value	β	SE	P-value	β	SE	P-value
HIV status⁵												
HIV-P	-0.508	0.466	0.276	-0.609	0.813	0.003	-0.717	3.238	0.830	-1.883	1.999	0.348
HIV-N (ref)												
Parity	0.113	0.141	0.018	0.114	0.128	0.374	0.143	0.157	0.795	-0.023	0.192	0.905
HIV*parity	-0.300	0.206	0.013	-0.231	0.194	0.236	0.044	0.168	0.364	0.158	0.169	0.351
SES⁶	0.245	0.059	0.001	0.019	0.078	0.806	0.044	0.057	0.439	0.185	0.122	0.132
Education										0.922	0.531	0.085
Secondary & higher	0.885	0.568	0.121	0.073	0.360	0.839	0.286	0.283	0.0002			
None (ref)												
Prevalence of BF (%)⁷	-0.069	0.399	0.986	-1.627	1.702	0.341	-0.008	0.011	0.444	-0.165	0.007	0.037
Prevalence of illness (%)⁸	-0.004	0.010	0.658	-0.005	0.009	0.203	-0.005	0.009	0.517	-0.006	0.011	0.059
HIV*illness	-0.020	0.011	0.065	-0.010	0.010	0.060	-0.018	0.107	0.099	-0.169	0.010	0.034
Depressed at⁹												
Only 0 months	-0.050	0.473	0.915	-0.004	0.812	0.996	-0.186	0.436	0.206	-0.097	0.512	0.850
HIV*Depression at only 0 mo	-0.392	0.637	0.539	-0.308	0.333	0.359	-0.863	0.521	0.010	-0.304	0.562	0.013
Social capital (#)¹⁰	0.014	0.136	0.917	0.064	0.109	0.562	1.260	0.650	0.055	0.172	0.005	0.023
HIV*Socail capital	1.469	0.787	0.064	0.462	0.669	0.023	0.312	0.369	0.011	0.255	0.739	0.731
Food security¹¹												
Insecure at 6 months							-1.471	0.992	0.141	-0.151	1.016	0.882
Secure at 6 months (ref)												
HIV*Food insecure at 6							-0.388	0.473	0.002	-0.737	0.435	0.092

¹Model Adj-R²= 0.0962, *P* = 0.0001; ²Model Adj-R²= 0.0602, *P* = 0.0025; ³Model Adj-R²= 0.01366, *P* < 0.0001; ⁴Model Adj-R²= 0.1481, *P* < 0.0001

⁵HIV status HIV positive (HIV-P); HIV negative (HIV-N)

⁶SES= Socioeconomic status; an index was created using principal component analysis (Range= -2 to +12; a higher index score indicates a higher household SES)

⁷Prevalence= % of observed breastfeeding days / (# of total days - # of not observed or missing days)

⁸ Prevalence= % of observed ill days / (# of total days - # of not observed or missing days)

⁹ Social capital is the number of formal and informal social groups in which a woman had membership

¹⁰Depression was measured using the Edinburgh Postnatal Depression Scale (Cox et al., 1987). Women who scored 13 and above were classified as showing depressive symptoms ("depressed")

¹¹Food security was measured using the USDA-Household Food Security Survey Model (HFSSM) (USDA, 2006). Households were classified into two categories: secure and insecure (Food secure was assigned to women who scored 0 on the HFSSM. Food insecure was assigned to women who scored 1-7 on the HFSSM)

Table 4.9. Multiple linear regression: Variables associated with postpartum weight change (kg) at 6 and 12 months in 314 Ghanaian women living in HIV-affected communities (cont'd.)

Predictor variable	1-6 ¹			1-12 ²		
	β	SE	P-value	β	SE	P-value
Maternal health						
HIV status ³						
HIV-P	-0.1966	0.5664	0.0082†	-0.22378	0.91659	0.0045
HIV-N (ref)						
BMI (kg/m ²) ⁴	0.1513	0.06496	0.0338†			
Prevalence of illness(%) ⁵				-0.2143	0.02338	0.0013
Economic status						
Occupation						
Trader				0.38822	1.1434	0.0034
Other (ref)						
SES ⁶	0.1808	0.09674	0.0116†			
Physiological state						
Prevalence of breastfeeding (%) ⁷				-0.15734	0.02423	0.0375

¹Model Adj-R²= 0.1422, *P* < 0.0001, An empty cell implies that variable was not retained in the final model

²Model Adj-R²= 0.1303, *P* < 0.0001

³HIV status: HIV-positive (HIV-P); HIV-negative (HIV-N)

⁴BMI= Body Mass Index = body weight in kilograms/height in meters squared

⁵Prevalence=Number of observed ill days/ (Number of total days- Number of not observed/missing days) *100

⁶SES= Socioeconomic status; an index was created using principal component analysis (Range= -2 to +12; a higher index score indicates a higher household SES)

⁷Number of observed breastfeeding days/ (Number of total days- Number of not observed/missing days) *100

BRIDGE

Weight loss during HIV infection may compromise health and hasten disease progression. To our knowledge, the first manuscript is the first to report postpartum weight change in relation to maternal HIV status among Ghanaian women. HIV-P women's postpartum weight change patterns differed significantly from HIV-N women whereby HIV-P women experienced a loss of weight postpartum while HIV-N women gained weight. What is of concern is that in a culture where weight gain is the norm, HIV-P women experienced a loss of weight during the same postpartum period. These contrasting results highlight the need to understand the nutrition challenges that HIV-P Ghanaian women experience and the support systems that are needed to help them protect their well-being. Therefore, to have a holistic understanding of factors that may influence dietary practices and nutritional status, a complementary qualitative study was conducted to examine the quality and availability of nutrition education services for HIV-P Ghanaian women.

CHAPTER 5: MANUSCRIPT 2

Nutrition education for HIV-positive women is inadequate in Ghana

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ABSTRACT

Background/aim: Progressive weight loss and wasting occur in most patients infected with HIV and contributes to increased risk of morbidity and mortality. Nutrition education and counselling may be an effective first-line intervention to prevent malnutrition. This study examined nutrition education offered by formal health services and HIV-service organizations.

Methods: Six focus group discussions were conducted with 38 HIV-P women (13 pregnant, 18 lactating, 7 non-pregnant and non-lactating) who were recruited from 2 HIV-service organizations, and 4 outpatient clinics. Semi-structured interviews were conducted with health workers (n=12), non-governmental and governmental personnel (n=5) and the deputy paramount Queen Mother (n=1). All focus group discussions and interviews were tape-recorded and translated for coding and analysis. Interview transcripts were coded and similar codes were grouped into main themes based on the theoretical framework, using NVivo version 8.0 for organization. Major issues and themes were noted for the frequency and context of their occurrences.

Results: HIV-P women cited health workers as their primary source of nutrition education. Additional sources included the church, prayer camps and mass media. Nutrition messages were provided by nurses and health assistants via group health education talks and private counselling sessions; none were based on patient assessment. Only one of the six sites visited had nutrition counselling materials. Health workers had good scientific knowledge about healthy eating and symptom management during HIV infection; however, they were more focused on breastfeeding and infant health than on maternal health. Women reported barriers to following recommendations, including financial insecurity, low support from health services and stigma. Perceived barriers to providing nutrition education included lack of audience-appropriate materials and in-service training.

Conclusion: Partnerships among government, non-government and faith-based organizations are needed to enhance communication and consistency of nutrition education messages offered to people living with HIV.

Key words: HIV, nutrition education, health services, pregnant, lactating, Ghana

Introduction

Sub-Saharan Africa (SSA) carries the greatest burden of the HIV/AIDS epidemic, accounting for 67% of all people living with HIV worldwide (UNAIDS, 2010). HIV may affect anyone; however women are disproportionately affected, being twice more likely to become infected with HIV. Reasons for this disproportionate disease burden include an increased biological susceptibility to HIV infection as well as a high vulnerability because of gender inequality, sexual violence, lack of power in sexual relationships, poverty, economic dependence and low education (Raisler & Cohn, 2005). In Ghana, the HIV prevalence ratio for female-to-male is 1.8 to 1 (2.7% vs. 1.5%); which is higher than that found in most population-based studies in Africa (Ghana Statistical Service, 2004).

HIV-positive (HIV-P) women in developing countries are particularly vulnerable to nutrient deficiencies because of likely inadequate dietary intake, poor dietary diversity, and increased nutrient requirements associated with HIV. However, little attention has been given to the diverse nutritional requirements women need when coping with HIV/AIDS despite the many studies that have shown that nutritional status during HIV infection is an indicator of the risk of morbidity and mortality (Palenicek et al., 1995; Piwoz, 2004).

Nutritional support is an integral part of a comprehensive response to HIV/AIDS (The United States President's Emergency Plan for AIDS Relief, 2006). Energy requirements to maintain adult body weight of asymptomatic people living with HIV/AIDS (PLWHA) increase by 10% over the requirements of people without HIV, while energy requirements of symptomatic PLWHA and people experiencing the onset of AIDS increase by 20–30% (WHO, 2003).

The influences affecting the health of Ghanaian HIV-P women are multi-factorial and have not been well-studied to date. One influence of importance is the nutrition information that is received from a variety of sources. A better understanding of the personal, social, and environmental influences on

providing nutrition education may come from investigating the experiences of health workers, HIV-P women, and staff at governmental and non-governmental institutions who are involved in providing care for PLWHA. Greater insights into the women's concerns and needs in terms of the nutrition education provided will help to shape recommendations for improvement. This present study examined the roles of health services and governmental and non-governmental organizations in providing nutrition education to HIV-P women. Ultimately, understanding the facilitators and the barriers to good maternal nutrition has major implications for the health and well-being of the Ghanaian population.

Although Ghana has an HIV policy (Ghana AIDS Commission, 2004), the policy does not stipulate nutrition and food support as a standard of care for PLWHA. Guidelines on nutrition and HIV were developed in 2006; however, these guidelines do not address clinical assessment, or counselling and management of acute malnutrition of adults living with HIV (Ghana Health Service, 2006)

HIV-P women need to be educated on the importance of maintaining a healthy weight with HIV infection. Providing nutrition education on making up a balanced diet and on the management of some of HIV-related symptoms is critical to improve nutritional status, quality of life and effectiveness of treatment (Bijlsma and Kangara, 1997).

Methodology

Theoretical Framework

The theoretical framework used in this study is the Modified Ecological Model for Health Behaviour and Health Promotion described by M'Cormack (M'Cormack, 2009). The framework describes individual change within the context of social change, and can assist in the evaluation of multiple-component nutrition education programs. The model includes: 1) intrapersonal 2) social and cultural environment 3) cues to action 4) physical environment 5)

cost/benefit analysis and 6) policy. Although nutrition education may ultimately need to be evaluated in terms of the effects of behavioural and dietary change, attention to the effects of nutrition education activities at the system, community, and organizational levels is important because changes at those levels can enable and reinforce changes at the individual level. The framework was used to identify factors that influence nutrition education provided to HIV-P women in Ghana.

Methods

The qualitative data collection period lasted 4 months, from June to September 2010. The data collected included: (1) observations in out-patient clinics and HIV-service organizations, (2) focus group discussions with HIV-P women, and (3) individual interviews with health workers, a female traditional leader (the deputy paramount queen mother), non-governmental and governmental personnel involved in nutrition education.

Study site

The study sites were Accra and Manya Krobo districts; the latter is a district in the Eastern Region of Ghana. The Accra district is the most densely populated part of the Greater Accra Region and includes the city of Accra, the capital of Ghana. Participants recruited in Accra were chosen from HIV-service organizations and Achimota Hospital on the assumption that Accra, an urban district, would have HIV services that were superior to those offered in Manya Krobo, a semi-rural district.

The Eastern Region had the highest HIV prevalence rate of 4.2% in 2008 (Ghana AIDS Commission, 2010). The population in this region is underserved, lacking adequate access to resources and health services. The services in Manya Krobo are quite small, with a few doctors who work as the administrative and medical head in each hospital. Participants recruited from Manya Krobo were chosen from St. Martin's Catholic Hospital and Atua

Government Hospital because they have the most active HIV/VCT program in the region.

Observational data collection

Observations in four out-patient community clinics and three HIV-service organizations in Accra and Manya Krobo were documented with field notes, pictures², and audio recordings. In the out-patient clinics, group health education talks, vital signs measurements and group HIV counselling sessions were observed. A field assistant, familiar with the local languages, translated the communication among health workers, as well as between the women and the health workers.

Focus group discussions and interviews

Two different qualitative methods were used to gather information. These were key informant interviews and focus group discussions (FGD). According to Patton (2002a) key informants are people who are particularly knowledgeable about the setting and can articulate their knowledge. Individual interviews provide in-depth information about a phenomenon of interest which in the case of this study was the concept of providing nutrition education. Focus groups provide interactive forums for participants to share their views and listen to and reflect on other participants' views.

FGD were conducted with HIV-P women while individual semi-structured interviews were conducted with health workers, a female traditional leader (the deputy paramount queen mother), and non-governmental and governmental personnel involved in nutrition education.

² Pictures of the physical settings, educational material, posters and the health workers were taken. No pictures were taken with any of the HIV-positive women who participated in the study.

Recruitment and selection criteria

Initial recruitment of participants was based on purposeful sampling with the intention of information saturation. All the participants were chosen based on their ability to contribute to the building of knowledge and development of theory on the proposed research questions. Rubin & Rubin (2005) suggest that results are more reliable when the researcher finds interviewees with the relevant, firsthand experience.

With the permission and approval of the support group leader and all the members, HIV-P women were recruited by attending support group meetings at out-patient clinics and HIV-service organizations. At the end of the meeting, HIV-P women were asked by the group leader if they would like to participate in the study. Criterion for participation was that they were HIV-P women; they could have or have not been pregnant or lactating. These women were included to allow for a discussion of previous and current experiences with health services and nutrition education. The expectation was that these HIV-P women had some exposure to nutrition education. Thirty-eight HIV-P women were recruited during the study (13 pregnant, 18 lactating, 7 non-pregnant and non-lactating).

Matrons of the out-patient clinics were asked to identify nurses and other key health workers involved in nutrition education and support for HIV-P women, who should be invited to participate in the interviews. All of the three nurses, three midwives, three health assistants, and two HIV counsellors who were invited to participate accepted. One doctor from one of the out-patient clinics reported being involved in nutrition education and agreed to an interview.

Queen Mothers are the female equivalents of chiefs in the Eastern region of Ghana. These women play an important role in HIV education as well as care for orphans in the communities. Only one Queen Mother, the Deputy Paramount Queen Mother, involved in HIV education was approached and invited to participate in the study. Food and Nutrition Technical Assistance II Project (FANTA II), Opportunities Industrialization Center International

(OICI), National Association of Positive Persons (NAP+), West Africa AIDS Foundation (WAAF), and Women United Against AIDS in Ghana (WUAAG) personnel and employees involved in nutrition education for PLWHA were selected based on referrals from other participants, through snowball sampling. These potential participants were approached and invited to participate in the research study. All five personnel who were invited, one from each of the aforementioned organizations, agreed to an interview. Detailed descriptions of the organizations included in this study are provided in the results section.

Procedures for focus group discussions and interviews

Interview and FGD guides were checked with field assistants, via translating into the local language and then back-translating into English, to ensure accuracy of translation (Jagosh & Boudreau, 2009).

Focus groups were formed with the aim of having 5-8 participants each (Patton, 2002a) and lasted approximately 1 hour. Both the field assistant and the primary researcher took field notes, the on the physical settings and the environment. The FGD guide was developed to better understand the women's experiences with hospital clinics and barriers they found in following recommendations with nutritional messages. The questions were open-ended to encourage discussion among the women and to explore any issues further (Krueger, 1998). The group interview method was used to capture participant interactions and social dynamics that may play into health beliefs and practices. The women were encouraged to express their own views even if they differed from the view of other participants.

Semi-structured individual interviews with key informants lasted 30 to 60 minutes. Questions addressed the participant's experiences related to providing nutrition education and care to PLWHA. Focus groups and individual interviews were tape-recorded and translated into English when necessary by a field assistant. Interviews were then transcribed by the primary investigator and the field assistants. All participation was voluntary. Privacy and confidentiality were encouraged and maintained as much as possible.

Informed and written consent for participant involvement, including audio-taping of the interviews, were obtained.

Demographic and other information

Socio-demographic information was obtained from the focus group and interview participants. Age, level of education, employment and other relevant information were collected to help bring context to the study findings.

Analyses of findings

Content analysis was used for analyzing the qualitative data in this study. The results were analyzed by the primary researcher and organized using Microsoft Word and NVivo version 8.0 (QSR International Pty. Ltd., Version 8, 2008). Data analysis involved a three-step coding process, namely, the discovery and naming of ideas, identification of themes, and integration of themes (Patton, 2002a; Strauss & Corbin, 1998). The themes generated were then organized for answering the research questions. The first step in the coding process involved an analytic process through which ideas and concepts expressed by the participants were discovered in the data and labelled (Strauss & Corbin, 1998). Attention was paid to concepts that were related to the research questions. This was followed by a more thorough re-reading of the transcripts and refining of the labels that were created during the initial reading. This process involved collapsing and renaming ideas and concepts based on their shared characteristics and related meanings (Patton, 2002a). In NVivo, tree nodes were used to link the codes and organize them into main categories and sub-categories. Common issues were noted for their occurrence across participant groups and for the contexts in which they were found (Krueger, 1998; De Negri & Thomas, 2003; Patton, 2002b). The themes identified provided bases for clustering and collapsing codes that conveyed similar concepts or meanings to develop meaningful and coherent themes for interpreting the data. The transcripts from the interviews and FGDs were reviewed several times to clarify understanding of the concepts, identify participant quotes to help illustrate issues, and to elaborate on the contexts of

participant responses. The final stage of data analysis involved the integration of themes into a theoretical framework for understanding the concepts from the perspectives of the participants (Patton, 2002a; Strauss & Corbin, 1998). The researcher integrated excerpts from the interview transcripts to illustrate concepts explicitly. Such excerpts from participants were the evidence to support and justify each theme, as well as the overall research findings.

Field notes and pictures of observational data were also analyzed by the primary researcher. The observations were used to identify important issues in nutrition education, to elaborate on and help validate the results from the interviews, and to highlight any disagreements between participant statements and observed practices. The major themes related to nutrition education that are described in the results section were chosen according to the a priori research questions of this study, as well as patterns that emerged from the FGDs, individual interviews and observations.

Results

Physical settings

In an attempt to help the reader understand the following results, a description of the various institutions where observations, interviews and FGD took place, is offered below.

Accra

The first FGD and six health worker interviews were conducted in an office at the International Health Care Center (IHCC). The IHCC is a community clinic open to the general public with a primary focus on HIV/AIDS positive patients. The clinic serves as a voluntary counselling and testing (VCT) center and has an on-site pharmacy. There are five health workers, one doctor, one HIV counsellor, one lab technician and one pharmacy technician. One of the clinic's benefits for HIV-P women is its strong connection with a non-governmental organization called West Africa AIDS Foundation (WAAF),

located on the same site as the clinic. WAAF focuses on research, advocacy, and helps the clinic in the care and support for HIV/AIDS positive patients through obtaining external funding. The clinic looks like a house from the outside rather than a clinic. The women refer to it as the '*hidden place*'; stating that they feel comfortable when they attend this clinic. Hospitals, such as Achimota Hospital, Ridge Hospital and Korle Bu Hospital in the Greater Accra Region collaborate with the clinic and refer patients for re-testing, counselling, treatment and medication. In addition, the clinic turns no one away; those who are not able to pay the 5 GHC (\$ 3.14 CAD) fee for antiretroviral drugs (ARVs) are still seen by the doctor or the nurse. The clinic keeps a log book for payments, and as stated by the health workers, most of the patients pay their dues when they can.

A semi-structured interview was conducted with the program director at WAAF to understand the activities in which they are involved in to nutrition and HIV. Another semi-structured interview was conducted with a health worker at Achimota hospital to uncover the flow and type of nutritional messages that are being disseminated from point of entry to place of referral, since HIV-P women are referred from Achimota Hospital to WAAF.

Through attending support group meetings, two FGD were conducted at the National Association of Positive Persons (NAP +). The support groups were "Humanity Health Focus" and "Women United Against Stigma". NAP+ Ghana is a national umbrella body for all groups active in improving the lives of people living with HIV. They are involved in directing and coordinating support groups and PLWHA associations by providing them with a common voice and a meeting place. All the support groups meet once a month on different days and are registered as community-based organizations. They are funded by Ghana Aids Commission, the Joint United Nations Programme on HIV/AIDS (UNAIDS) and National AIDS Control Programme.

A semi-structured interview was carried out with an administrative staff member working at a non-governmental agency called Women United Against AIDS in Ghana (WUAAG). WUAAG is the first association that supported only HIV-P and affected women in Ghana.

Food and Nutrition Technical Assistance Project II (FANTA II) is 5 year (2008-2013) project working to improve nutrition and food security policies, strategies, and programs, managed by the Academy of Education Development (AED) and funded by the United States Agency for International Development (USAID). Recognizing the need to improve nutrition assessment, counselling and support, FANTA II was requested by USAID and Ghana Health Services (GHS) to assess opportunities for integrating nutrition into HIV services in Ghana. Another relevant organization was the Opportunities Industrialization Center International (OICI) Ghana. OICI is a non-governmental organization, funded by USAID, who came and set up the “Enhance Program” that aimed to improve human capabilities in health and nutrition of pregnant and lactating women, and children. Personnel from FANTA II and OICI were interviewed to capture a full view of the HIV-related nutrition activities that are occurring in Ghana. Both interviews were done in the participants’ office.

Manya Krobo

Three FGD and 5 health worker interviews were conducted in St. Martin’s Catholic Hospital and Atua Government Hospital. The FGDs were conducted in a secluded outdoor area of the hospital where HIV patients usually meet for their “adherence to the drug” meeting and counselling. The health worker interviews were carried out in an office at the antenatal and postnatal clinics.

Demographic characteristics

A sample of 38 HIV-P women participated in the study, 22 in Accra (Greater Accra Region) and 16 in Manya Krobo (Eastern Region). They ranged in age from 20 to 42 years, they had zero to sixteen years of schooling, with more than half of them having Junior Secondary School level 3 as their highest level of education. Most women had one or two children, but parity ranged from one to five children. Thirty-one out of the 38 HIV-P women belonged to a support group.

The nurses, midwives and health assistants, ranged in age from 24 to 61 years, with the doctor, head nurses and midwives being older and health assistants generally being younger. All but one health assistant had completed secondary education, and all nurses and midwives had completed two to four years of post-secondary education. The health workers had zero to five children. Two participants were HIV-P and referenced their experiences as an HIV-P person with other HIV-P patients, acting as “Models of Hope”. Models of Hope are HIV-P peer counsellors who are recruited into hospitals and HIV-service organizations in Ghana and serve as positive role models for other PLWHA.

Major themes related to nutrition education in Ghana

This study examined nutrition education within the context of HIV infection. Focusing on the research questions mentioned above, the results were organized into themes. These findings are discussed below and supported with participant quotes³ for illustrative purposes.

Similarities between health worker’s knowledge & recommendations and HIV-positive women’s reported knowledge & dietary practices

Discoveries about the knowledge and recommendations reported by health workers

The health workers’ knowledge of nutrition during HIV infection was discussed at length in the interviews with health workers. During the individual interviews, group counselling sessions and the observed health talks, nurses and health assistants recommended uniformly that HIV patients should take care of their general health. Increasing the consumption of fruits and vegetables and decreasing the consumption of spicy and fatty foods were numerous mentioned by all health workers. These recommendations although sound, do not specifically teach on which nutritious foods to eat and the way to prepare them. For example, which local fatty foods to avoid were

³ English language errors in participant quotes are those of the translators and do not reflect the linguistic skills of the participants in their mother tongues.

not explained. The information provided by the health workers and the knowledge of HIV-P women regarding nutrition was similar and consistent, however, generalized and might not be as effective as individualized counselling based on assessment.

What they eat should involve a lot of foods that contain vitamins; they should avoid a lot of fatty foods, because of their condition. (HIV counsellor 1)

Normally their blood level lowers, so we advice on well balanced diet which is at least the fish and the meat to be there, we live on Kenkey and the Banku and all those things...The soup should be more than the Banku. Then after that, one or two oranges if they can afford. (Midwife 1)

Health workers knowledge of nutrition was generalized to broad health issues and was not based on patient assessment. None of the health workers mentioned that they referred to their patient's charts or file for a personalized assessment. They reported that they would address nutrition in follow-ups only if the patient looked like they were losing weight. When asked if they assess or calculate how much energy or nutrients their patients needed; the health workers explained that this method was not used because mothers were assumed to not know or understand any technical terms.

If I come and calculate all sorts of energies and that kind of thing, I really believe a lot of the times they don't really understand. I hear that a lot with clients who for instance have diabetes, they go to the diabetic units in hospitals and where they tell them amounts of foods to eat, measuring food with matchboxes. So they tell me that they are confused. They don't really get it that way, and if it becomes too complex for them, they probably would not do what you are asking them to do, so you have to make it as simple as possible. (Doctor)

According to the health workers, putting their recommendation into context made HIV-P women understand and respond better to recommendations.

Immediately you mention vegetables, their minds go to expensive things, so I always have to bring it down to their level, show them some of the common vegetables that we have and educate them about that. And some of them, when I do that, they adhere to it, and come the next time and tell me about it. (HIV counsellor 1)

I tell them look around us, we have some fruits, banana is not all that expensive; we have oranges and mango. When you tell them they say oh yes! They probably don't think about it. They think they have to go and buy strawberries or something. And we don't have those kinds of things here. I really think they have to be reminded of all these simple things that are just around them. (Doctor)

Discoveries about the nutrition knowledge reported by HIV-P women

According to the health workers, one of HIV-P women's concerns upon diagnosis was whether they should be on a special diet or not.

Many always like to know whether they should eat special foods, because of they think they will be like skeletons and that with their drugs they should take foods that contain rich, nutritious foods, so that your body will be able to stand, because the virus is destroying the immune system, so eat rich foods so that the medicines can work well. (Health assistant 2)

Some FGD questions examined self-reported nutrition knowledge and dietary practices. Most of the participants understood the importance of consuming a healthy diet which they explain as eating fruits and vegetables, increasing the frequency of meals, “*eating whenever hungry*”, and reducing fats and oils. When asked about their usual food intake, the majority of the participants had a higher dependency on starchy foods like banku (fermented corn and cassava dough), fufu (mashed plantain/cassava), kenkey (steamed fermented corn dough), maize, and rice. Foods of animal origin and fruits that play vital

immunity and protective roles were consumed infrequently and in small amounts in comparison to the starchy foods.

I know that in my condition I should be taking fruits and such things, but I don't have money to buy watermelon and those things. I normally prepare banku because it's the most economical, but my favourite is fufu and plaintain, but I cannot afford that. (FGD 2)

If I take the banku, I stay full for a long time. I take it with shito (hot pepper sauce) normally, but sometimes if I get some okro (okra) I mix it with ademe leaves, or I make some soup like groundnut and palmnut to eat with the banku. (FGD 2)

Challenges in translating knowledge into practice

For HIV-P women, the main barriers for following nutrition recommendations received included financial insecurity, little contact and support for HIV-P women, deflection from HIV-P women to infant, and stigma. For health worker the main barriers to providing nutrition education included limited in-service training for staff and lack of audience-appropriate teaching material, each of these is discussed below.

For the HIV-P women:

1) Financial insecurity

Financial insecurity was identified by the HIV-P women as their single most influencing factor in the acquisition of needed foods. In addition inability to pay for medication was a reason why they might choose not to see a health care professional. Health workers' supported HIV-P women's statements on the effect of their unstable income.

The barriers are truly financial constraints with some of the clients. Even simple things like the banana and oranges which are not that expensive, truly some of them cannot afford it. If they are to buy maybe

an orange with their small 50Gp [30 Canadian cents], then they are thinking I can't buy real food to feed my child or whatever. This makes it difficult because you give them medication and sometimes you find that they are not really doing that well because they don't have the right nutrition to back the treatment up (Doctor)

2) Amount and quality of contact between health workers and HIV-positive women

HIV counsellors expressed the importance of developing rapport with HIV-P women for the uptake of any message or recommendation given by health workers including nutrition messages. When HIV-P women are with the HIV counsellors in the private sessions, more room is given to questions and concerns about health and nutrition. The HIV counsellor is the one that spends the most time with them while nurses and other health care providers explained that there was limited time available for nutrition education because other topics needed to be discussed with the women, including any opportunistic infections, hygiene and family planning. Therefore, the contact time between other health workers and the HIV-P women was not enough to develop rapport and to discuss pertinent issues regarding their nutritional status and concerns. In addition, some health workers mentioned that they provide nutrition education on the first day but not on follow-ups or when the 'need arises', while talks on breastfeeding and infant health were generally given weekly to HIV-P and HIV-negative women pregnant or breastfeeding women.

Another concern was the availability of doctors; the patient to doctor ratio is high, and therefore not all women had the opportunity to see the doctor even if it was an emergency. Heavy work load and insufficient staffing were major constraints reported by staff. Health care providers carried out other responsibilities within the facilities in addition to providing services for HIV-P individuals, thus reducing the amount and quality of the services being provided.

How women were treated when seeking health care, that is, the knowledge and competence of providers demonstrated in regard to HIV, and the welcome they extended to HIV-P clients determined if women felt they could return or not. Women were more likely to seek continued health care at clinics and health centres where they felt they were understood and respected. Overwhelmingly, they felt more comfortable getting care at HIV-specialized sites such as the IHCC.

Low support from health services was experienced by HIV-P women. Favouritism by health workers was a major source of frustration when attending the clinic. Some HIV-P women complained that they had to wake up as early as 3 AM to be able to make it to the hospital only to have the health workers attend to people they know first or to those that have ‘*connections*’ before attending to the patients who came first. In addition, some HIV-P women disliked and sometimes avoided going to the hospital because the health care staff often shouted at them, and communicated hurtful or ‘*painful*’ comments. This was observed at an ‘adherence to the drug’ meeting that was done at one of the hospitals visited. The health worker shouted at one of the women for not getting her receipt to get the drug on time. A few of the HIV-P women also expressed that they could not confide in the nurses, especially if they were new, and that stopped them from informing the nurses of possible problems or concerns they were having. This attitude of superiority and insensitivity may be a deterrent for clinic attendance among HIV-P women.

3) Deflection from the HIV-positive women to the infant

This study focused on women because they shoulder much of the burden of HIV infection in terms of their responsibilities for providing food and care to their family members. In all of the health care facilities, booklets, brochures, and posters were available to help the mother care for her child. Some of these include “National Infant and Young Child Feeding for Ghana” booklet, “Give Your Child Family Foods Whilst Breastfeeding Continues” brochure, and many posters on breastfeeding methods and options. Additionally, observed posters pertinent to HIV, which were produced by the GHS and the Ministry

of Health (MOH) were only addressing domestic violence, safe sex, and antiretroviral treatment guidelines.

During the interviews with the health workers, many of their answers were deflected to the child. The primary researcher had to redirect the interview to focus on HIV-P women's health and nutrition.

We weigh the mothers when they come, but what is more important is that we weigh the baby at the postnatal, so they come with the child care card, if it going down you counsel the women, that oh you are not taking care of the baby well, so we help her to solve her baby's problem, we will be monitoring the baby, she will bring the baby every two weeks, until we see the baby is doing well before you leave the women alone. (Midwife 2)

4) Stigma

Most of the HIV-P women as well as the health workers expressed that stigma prevented or delayed the women from coming to the clinic. Some found it difficult to disclose their status to their partner. Therefore, they avoided the clinic to hide their status. Secrecy was seen as a protection from the shame associated with HIV infection and fear of being shunned by their family.

The women's main concern is they don't want people to know. Even some don't want their husband to know (Midwife 1)

For Health workers:

1) In-service training for health workers

Limited staff training on nutrition during HIV infection may have contributed to the generalized discussions about nutrition with HIV-P women. Both hospital workers and the OICI representative explained that nutrition had not yet been the main theme of any staff workshops. The staff trainings on nutrition during HIV infection included issues such as hygiene, breast health

and breastfeeding and were more focused on infant health rather than the HIV-P women herself. In general, only the higher-level staff members attended training workshops.

I think if we could get some on-going training to keep us abreast, 'cos I am sure there are a whole lot of things that we don't know. So maybe some trainings from nutritional departments so that we have the up to date things and then also some nutritional materials, some guidelines to go by with, so that we are all saying the same things because every now and then if the clients come to me I think I may say something that the counsellor might twist a little bit. Then they get confused. But if we are all going by the same protocols, it makes it easier, 'cos then they are like, oh yes, the counsellor said it, the doctor also said it. It would re-enforce it. (Doctor)

2) Teaching Materials

One out of six of the sites visited had teaching material specific to HIV-P individuals: a booklet entitled “Positive living and health eating”, a guideline developed in 2006 and inaugurated in 2009. However, even at this site, health workers did not find it useful to use the teaching material. According to health workers, sufficient and audience-appropriate teaching materials were not available in hospitals, clinics, and HIV-service organizations.

I don't really have a specific material that I use during our trainings, we have this booklet, we give it to the mothers who can read and understand, but mostly we had some basic training in nutrition so I kind of tend to refer back to that but I don't have like a guideline to go by. (Doctor)

Converging and diverging sources of information on nutrition for HIV-positive women and health workers

Sources of information for health workers

1) In-service training

On-going training was not a major source of information for health care staff in terms of knowledge about nutrition. Few staff members attended trainings on a regular basis, and nutrition was briefly *touched on* or discussed in trainings for HIV care. Maternal health had not yet been the main focus of in-service training; the focus is often on breastfeeding and prevention of mother-to-child-transmission (PMTCT) of HIV. The last and most common reported training session was done by Family Health International (FHI). FHI is a global health and development organization that implements public health programs addressing HIV research, care, treatment and prevention.

We had sessions on nutrition as well as other topics, but it was not very detailed on nutrition and it was a onetime thing. We cannot tell if what we learnt and we are still doing is now old, should we adjust? So maybe the nutrition department of the university or wherever could give us training on nutrition, like some sort of refresher courses.
(Doctor)

2) Formal education

In Ghana, nursing and midwifery involve two years of post-secondary education in a “Community Health Nurse’s Training School”. The nurses and midwives interviewed (n=6) had training in both nursing and midwifery. The HIV counsellors (n=2) were trained by FHI. The doctor also had several years of post-secondary training. Doctors, nurses and midwives had all received some formal education on general nutrition. Health assistants usually had secondary school education, where they received some limited information on general health and nutrition.

3) Health centre postnatal clinics (on-the-job learning)

Health assistants explained that much of their knowledge about nutrition came from learning on-the-job. Some health assistants cited learning nutrition messages from watching the doctor talk to patients. Assistants learned by watching nurses give group health talks given at the antenatal clinic.

*With regard to nutrition education, normally when the doctor is talking to the patient, I learn from it, and that's how I got the knowledge
(Health assistant 1)*

4) Personal interest

Health assistants also explained that much of their knowledge about nutrition came from reading books and researching about HIV and nutrition.

Sometimes I do researches on the net and then the book we have here and then I have other books at home, so those I have been reading so I elaborate on to them when patients ask me (Health assistant 2)

Sources of information for HIV-positive women

1) Health services

Most women cited the hospital as the main source of health and nutrition information. All the focus groups came to the consensus that the hospital was the most common source of information on nutrition. In hospitals and clinics, health and nutrition messages were provided via private counselling and short group education talks.

1a) Private counselling sessions

Private counselling sessions were conducted at each of the hospitals, postnatal and outpatient clinics in the HIV counsellor's offices. During private counselling, the HIV counsellor or the midwife/nurse discussed many issues

related to coping with the disease including health, nutritional status, and illnesses or side effects of the drug. On occasions, or when asked, health assistants also gave individual counselling, usually when taking the patients vitals or when a regular nurse was absent. Private counselling was not directly observed due to confidentiality issues. The content of what was discussed with mothers during private counselling was assessed through interviews with health care staff.

1b) Group health education talks

In the hospitals, there were no group health education talks specific to HIV-P women. Whether HIV-P or HIV-N, the women were included in these group health education talks. The teaching method used was only verbal; none included job aids or teaching materials. The talk was primarily done by the nurse in a hospital setting, and it was followed by a question and answer period. Women then had the opportunity to share their experiences and knowledge to other members of the group.

2) Support Groups

Group health education talks specific to HIV-P women were observed in support group meetings, and in the IHCC. The talks included information on the general care for PLWHA, the importance of disclosure, breastfeeding, adherence to the drug, infant health, proper hygiene practices and healthy living which involved messages on the importance of nutrition. There were no guidelines followed when discussing nutrition and HIV. The talk was followed by a question and answer period, and then the women had the opportunity of sharing experiences and knowledge to the members of the group.

3) Media

HIV-P women also mentioned learning about nutritious foods from the radio or other media. The health workers also expressed the role that media plays in nutrition education. This source of information was viewed negatively by the

health workers as well as the HIV-P women in propagating negative messages about the disease, amplifying stigma and misconceptions.

Some of them they will tell you that they heard it on TV, radio – the media. I think the media are playing their role only that they are making it more difficult than it should be. Because some people think that, as soon as you are diagnosed HIV positive, you have signed your death warrant. That is the kind of information they get out there. The kind of pictures they show on TV when they mention HIV, they'll bring in a skeleton. So if I am there and I am HIV positive, what do you expect, I know that I am dying. So it makes the things very difficult for us, because you have to really convince this man or this woman that that is not the end of it. (HIV counsellor 1)

4) Faith-based organizations

Some health workers expressed the importance of the role that faith-based organizations (i.e., church and prayer camps) play in the decision making process of HIV-P women in regards to their health.

The nutrition aspect is most times done in our clinics, in our country. But sometimes it would be done in the church, it is done generally not specifically for a particular condition maybe hypertension or diabetes or something. Once a while the church may invite somebody to speak to the members, probably they are organizing a health week or something. And even that one it is not only nutrition, maybe infectious diseases and things and maybe once a while nutrition comes in as well. (HIV counsellor 1)

Messages from faith-based organization were sometimes incompatible with messages from health services. This conflict of information was cited by many of health workers who expressed their frustrations on the significant influence that these organizations have on HIV-P women's decisions.

Recently I called two of the women that were assigned to me and they told me that they were at a Prayer Camp because they feel it is a spiritual disease. When people come to me like that, I include in my counselling that before any pastor would advice you that he's prayed for you for the disease to go, just come again and confirm first. Even if he asks you not to take the medicine, you hide and take it till it is confirmed that you are negative (Health worker 1)

The churches are one of the worst sources that can ever be, because they have the most influence, Ghanaians are very religious and to some extent it is harmful that they believe in everything the Pastor would say; 'Believe and you will be healed, you are healed by your faith, if you express any doubt God will not heal you'. That is sickly. Everyone is influenced by it, the literate and illiterate (WUAAG representative).

5) Family and friends

Most HIV-P women indicated that they do not ask for advice from their family and friends, because most of them have not disclosed their status. They would share and exchange information with friends they make in support groups that are also HIV-P. This highlights the importance of being a part of support groups and advocating for people living with HIV.

Mostly we don't talk about these things outside so we don't get such information from family and friends. Maybe when we meet here, then we would talk to friends here about it but we would not do that outside (FGD 3).

The health workers also supported HIV-P women's statements about not asking for advice from their family members because of stigma.

Usually the women try to keep HIV as a secret so no one really asks about what is best to eat or what would help from anybody. So other

than the clinic, I don't think anyone gives information about health and foods. (Health assistant 1)

That said, some ancestral beliefs and messages regarding certain foods are still inherited and practiced by some HIV-P women. This may affect the efficacy of nutrition education by posing challenges on the provider and the HIV-P women since they both have to deal with conflicting nutrition messages.

We have superstitious belief, our mothers our ancestors have told us that if you are pregnant and you take egg your child's eye will be damaged. Sometimes clients say I am not taking okro because they it is not good for HIV. They say it's slimy so it's not good for the chest. So I tell them that no, you can eat okro. And the other thing, is also part of nutrition, they also say that if you have diarrhoea, you shouldn't take water. Because then you'll have more diarrhoea. This is rather conflicting because you rather have to take more water. (Doctor)

From being silenced to gaining voice

Improving HIV-positive women's health and wellbeing through integrating nutrition assessment, counselling and support into HIV services

In February 2010, the Ghana Health Services (GHS) identified the need to improve nutrition assessment, counselling and support at antiretroviral therapy sites in Ghana. As a first step in this process, GHS and USAID requested FANTA-2 support to assess opportunities for integrating nutrition into HIV services in Ghana.

If you look at the guidelines for nutrition, they don't really talk about assessment, counselling. They don't talk about description; they just talk about very general issues, so we are trying to update the guidelines with these activities included. What we are saying is adding the component of assessment, how do you know this person needs nutrition support, you got to assess, not everybody really needs the

nutrition support. Yes, good diet is good, but what is good for various categories of people. (FANTA II representative)

Nutrition for HIV-positive people is a new component that we want to add to the teaching materials, for this to be done we have to update the existing nutrition guidelines and teaching materials from other countries and make it applicable to Ghana, we also want to add job aids for health workers so they can use as a quick reference. (FANTA II representative)

Discussion

This study was based on the theoretical understanding that health behaviour and health promotion are influenced and directed by socio-ecological factors. Therefore, the Modified Ecological Model for Health Behaviour and Health Promotion as the theoretical model for the study was used to frame discussions. Components for the Modified Ecological Model for Health Behaviour and Health Promotion are intrapersonal, social and cultural environment, cues to action, physical environment, policy, and cost/benefit analysis.

Intrapersonal factors

Intrapersonal factors include demographic variables such as age, ethnicity, socioeconomic status, knowledge and educational level that act as modifying factors to account for a person's engagement in the behaviour (Janz & Becker, 1984). The literature suggests that HIV infection occurs in the most productive section of the population, and as HIV disease progresses, an individual's work participation, productivity, and income-generating capacity decline drastically due to increases in illness and weakness (Gillespie, 2008). In this study, HIV-P women identified financial insecurity as their single most influencing factor in the acquisition of needed foods and a reason why they might choose to not see a health care professional because of their inability to pay for medication. A study by Lemke et al. (2003) revealed that income in a South African

household led by men was about three times that in households led by women and also considerable higher than in household characterized by a partnership relationship. Women-headed households had more worries about the food situation than in other households. Sixty percent of the women in the study (n=166) indicated that sometimes there was not enough food for children confirming the relationship between socioeconomic status and food security. Nutritional care is constrained by low socioeconomic status; nutrition education and counselling should be individualized to provide knowledge that can enable HIV-P individuals to make informed decisions regarding healthy food choices according to their financial circumstances and the availability of food.

Social and cultural environment

The social and cultural environment refers to the formal and informal interactions and social support systems that HIV-P women are involved in or surrounded with, as well as the social climate which discusses the supportiveness of the social setting for particular behavioural choices (McLeory et al., 1988). Health-related behaviour is a function of the sociocultural and environmental contexts in which it occurs (Bhattacharya, 2004). HIV-P women in this study cited some problematic health care interactions that deterred women from seeking health care. They described positive health care experiences when they felt loved, valued and accepted by health care providers. Other HIV-P women also described negative health care experiences. Negative encounters were more likely to occur when seeking care at hospitals, where, according to participants, health workers were not as knowledgeable about HIV. This finding is supported by Adegboye's (1994) study that reported that AIDS patients in Nigeria were the subject of neglect and were objects of exhibition. Only a third of physicians and a quarter of nurses said they would take care of an AIDS patient. Women reported they were more likely to experience stigma and discrimination at these hospitals versus the HIV specific health care clinics. Most of these positive health care stories involved HIV specific health care clinics (i.e., IHCC). Women believed that these facilities were more knowledgeable about HIV, and that they did not

feel stigmatized or discriminated against while accessing health care from these sites. In addition, those who were involved in support groups were also more likely to report positive health care experiences as they had learned how to assertively access resources through the groups. This discrepancy was more likely due to the fact that health workers at the HIV-service organizations knew that they would be serving only HIV-P individuals, so they were more likely to be more knowledgeable about HIV infection and were therefore able to provide their services without discrimination. The low acceptance of HIV/AIDS patients from hospital staff has serious implications for treatment, prevention, and human rights (Adegboye, 1994).

Studies have shown that spirituality has been used as an individual resource for dealing with depression and emotional distress and for adjusting to uncertainties, especially in cases where usual coping resources are exhausted (Simoni et al., 2002). For many HIV-P women, spirituality becomes an important buffer against HIV-associated stressors. The church in Ghana plays an essential role in the fight against AIDS (Anonymous/symposium paper, 2009). The influential leadership in churches makes the church a great podium for speaking on HIV/AIDS; however leaders' messages do not always have a positive effect on the people. Our study showed that these messages may steer negative health outcomes. All the health workers cited religious bodies such as the church and prayer camps as influential sources of information, propagating messages that drove some HIV-P individuals to choosing traditional medicine stopping the ARV's or to believing HIV to be a spiritual disease.

HIV-P women as well as the health workers expressed that stigma prevent the women from coming to the clinic for counselling. Some find it difficult to disclose their status to their partner and are therefore isolated, carrying the burden on their own, and putting additional strain on themselves. The solution to them was to not seek advice from family and friends and to avoid visiting the clinic when they need to, to hide their status. In addition, HIV-P women claimed that they suffered discrimination due to stigma which has lead to them losing their jobs. Loss of employment leads to loss of income; which in turn may prevent them from accessing food, care, and medication due to the extra

costs. Some HIV-P women also noted that in some health services, the health workers contribute to stigma and discrimination by not caring for their patients appropriately and equally. Education at the community level has been advocated as a key strategy to reduce stigma attached to HIV illness in Ghana (Anarfi, 1995). However, public education about HIV illness in Ghana has been limited. Reasons include the belief that public discussions regarding HIV are a violation of traditional values and the trend of associating HIV with immoral behaviour (Mill, 2003).

Physical environment

The physical environment refers to resource availability and access to resources (Sallis & Owen, 2002), in terms of HIV-related nutrition education; resources are teaching materials that can be use to enhance education.

Individuals respond differently to various methods of education. In most cases adults learn best when they are actively involved in nutrition education (FHI, 2007). One guideline for nutrition education during HIV infection was developed by the MOH/GHS in 2006 and inaugurated in 2009 (Ghana Health Service, 2006), however only one site out of six had one and even in that site, it was not used. Without teaching materials, health workers might find it difficult to elaborate on what they know, illustrate what they are trying to explain and refer back for more information when they have questions. This factor may have contributed to the generalized recommendations given to HIV-P individuals, rendering them less effective. Tailored nutrition education messages can be delivered via an individualized approach, such as one-on-one counselling, small-group education sessions, peer education, or written nutrition information. In the health facilities visited, the method of delivery was one-on-one counselling and group health talks in hospitals and clinics, and peer education in support groups. HIV-P women expressed their fear of being seen by other people from the community, especially in cases where the HIV-P have not disclosed to members of her family. Some HIV-P women expressed the need for a more private place so they are more comfortable. Personnel from the MOH/GHS are currently taking steps to provide new teaching material and job aids for health workers. The need has been

recognized; governmental and non-governmental organizations are joining forces to develop and implement teaching materials in all ARV sites in Ghana.

Cues to action

Cues to action are external events that prompt a desire to make a health change. They typically help move someone from wanting to make a health change to actually making the change. The main cues to action were in the form of reminders from the healthcare provider at the health facility during follow-up or if questioned. Most of what was shared was oral because according to health workers, most of the HIV-P individuals are illiterate. In addition, another medium for prompting a desire to make a health change was the radio. The radio was often cited by HIV-P women and health workers as a source of nutrition and HIV disease information. According to health workers, the radio should be used to promote nutrition messages and dispel stigma attached to HIV rather than to spread negative messages. The majority of sub-Saharan African populations depend on the radio for communication and information exchange (Pigato, 2001). Radio is found to be present in 65% of urban households and 38% of rural households, while Television, for example, is present in only 28% of urban households and only 3% of rural ones. A study by Lujan et al. (2003) evaluated a nutrition education intervention using a radio programme in the Canary Islands and found that at 2 months post-intervention, there was an increase of 10% ($P < 0.001$) in consumption of pulses, salads, fruits and juices, cereals and fish, and a decrease in the consumption of meat, sausages, pastries, French fries, bread and eggs were observed. HIV-P women's needs can be served by providing information regarding issues on nutrition, medicines, infant feeding, and other related topics.

Policies addressing maternal health and nutrition during HIV infection

Although Ghana has an HIV policy, the policy does not stipulate nutrition and food support as a standard of care for PLWHA (Ghana AIDS Commission, 2004). There are Guidelines on Nutrition and HIV developed in 2006 and

inaugurated early 2009, however, these guidelines do not address the clinical assessment, counselling and management of malnutrition of adults living with HIV (Ghana Health Service, 2006)

There are some developing countries that have had successful policies that address nutrition during HIV infection. In Kenya, under the nutrition agenda, the Economic Recovery Strategy underlines the decision to carry out awareness campaigns on the benefits of improved nutrition and promote production and consumption of nutritious food (Republic of Kenya Ministry of Medical Services, 2008). To achieve that, training material were developed, guidelines were reviewed and adapted, strengthening of human resource capacity and assurance of quality and standards were all a part of a framework that addressed the nutritional needs of PLWHA. Research on the effect of integrating nutrition into HIV policy on nutritional status and dietary intake is needed.

Cost/benefit analysis

Cost/benefit analysis refers to one's belief in the efficacy or costs of the advised action to reduce risk or seriousness of the impact. Reasons that were given for following a recommendation or not following were based primarily on financial viability. Several times the issue of money to pay for services, to eat the proper foods, to find transportation fares to visit a health facility, to purchase the necessary treatments, prophylaxis, or antenatal vitamins were expressed as a concern of participants. Participants cited personal benefits of seeking care and treatment to their health and wellbeing. The main factors that promoted participation in care is "staying healthy for child", the women's fear for the safety and welfare of their children often kept them following their medical regimens as much as they can, when they would otherwise have given up. In addition, women in the study felt that access to HIV care was life saving, they were more likely to recognize that seeking health care during HIV infection, even with the presence of some problematic health care interactions, was beneficial for their health outcome. A qualitative study by Nyamathi et al. (2009) also indicated that HIV-P women were unable to seek care as a

result of lack of finances to travel to the provider, or having someone to care for their children. However, they sought care immediately when their children were sick. This supports our current study that the major deterrent was financial feasibility and that one of the principal motivators in accessing care was the HIV-P women's child. However, Nyamathi et al. (2009) stated that participants mentioned that if when they had no one to take care of their children, it made it all the more difficult to access care when needed. It is important for health workers to identify and implement innovative means of fostering support for these women in order for them to be able to seek care whenever needed. In a study by Kirksey et al. (2003) examining the relationships among self-efficacy, social support, quality of life, and overall health perception in a sample of 61 HIV-P women. The study showed that overall, the combination of predictors explained 25.5% of the variance in the outcome variable, perceived health status. In the analysis, social support and quality of life had a direct effect on overall health perception. Self-efficacy had an indirect impact on overall health perception via social support. Therefore, with social support, women are able to realize their importance of maintaining their health.

In conclusion, health workers play an important role in providing nutrition education in terms of imparting knowledge and providing support to HIV-P women. However, nutrition education for HIV-P women in Ghana is limited. Health workers depend on general knowledge that may be less effective in the recipient's uptake of knowledge and changes in behaviour. Tailored nutrition messages may be more successful at changing individual's behaviour. Emphasis needs to be given on the other sources of nutrition information that HIV-P women are bombarded with. Faith-based organizations, non-governmental HIV-service organizations and support groups all provide nutrition education for HIV-P individuals and should be taken into consideration when implementing a nutrition education intervention.

CHAPTER 6: GENERAL CONCLUSIONS AND POLICY IMPLICATIONS

Currently, Ghana's efforts against HIV/AIDS are led by the Ghana AIDS Commission (GAC) (USAID, 2010). The President of Ghana, serving as Chairman of the GAC provides the highest level leadership in creating a supportive and an enabling environment. Several national policies and guidelines were developed by GAC that address the HIV/AIDS epidemic in Ghana. Some of these include the National Workplace HIV/AIDS policy, Prevention from Mother to Child Transmission (PMTCT) guidelines, a policy for Orphans and Vulnerable Children (OVC), national HIV/AIDS/STI guidelines, and other HIV/AIDS related policies (Ghana AIDS Commission, 2004). The aforementioned national response, however, does not stipulate nutrition and food support as a standard of care for PLWHA. One of the policy's goals is to ensure the reduction and mitigation of the impact of HIV infection on health, socioeconomic, psychosocial status on the infected as well as affected individuals and the whole nation (Ghana AIDS Commission, 2004). Nutritional support has the potential of significantly prolonging the life of individuals for their own benefit and those who are dependent on them for care thus, reduces vulnerability to the impact of HIV (The United States President's Emergency Plan for AIDS Relief, 2006). This thesis demonstrated that maternal health, physiological state and economic status were predictors of postpartum weight change in lactating Ghanaian women in the 1st year postpartum. Overall, there was a net weight loss among HIV-P women compared to a net weight gain among HIV-N women over 12 months postpartum. The relationship between HIV status, lactation, and postpartum weight loss is complex and multifactorial. With that in mind, it is important to note that many interventions have focused on pregnancy-related nutrition and health problems and very few investigated the postpartum period. In addition, unlike prenatal and intrapartum care, where clear standards are available, postpartum care does not incorporate in a comprehensive package all the essential elements including nutrition that are required for the health of a woman.

Nutritional support for people with HIV/AIDS should be provided in a holistic manner that strengthens food security, health services, and care. There are several different approaches to designing and implementing appropriate nutrition-based interventions aimed at preventing and mitigating HIV/AIDS impacts. Specific to postpartum HIV-P women, relevant objectives of such interventions might include individualized nutrition assessment, education and counselling in health facilities or in community settings to (i) manage weight loss, (ii) change dietary habits, (iii) increase consumption of key foods and nutrients, (iv) manage HIV-related symptoms and (v) increase awareness of drug and food interactions. Other objectives could be aimed to increase food security through providing food baskets for home preparation, or through micro-finance programs.

Furthermore, to strengthen and sustain any nutrition-based intervention, continuous in-service training is needed for health care staff in Ghana with a focus on nutrition during HIV infection. The absence of adequate training may have contributed to the generalized recommendations that HIV-P women are receiving today. Without basic knowledge on the usual food intake of the HIV-P women, the health worker will only be able to give very general recommendations. Accordingly, health workers in HIV-affected communities should have a thorough knowledge of local resources and infrastructure to optimize the quality of care offered to each woman. Furthermore, health care providers and program managers should take advantage of all points of contact to provide counselling on nutrition to ensure that PLWHAs maintain a healthy diet, manage illness and monitor and maintain nutritional status. Nutrition education can be incorporated into existing services or facilities to support promotion of nutrition for PLWHA. A number of contact points can be adapted to include a nutrition component. These contact points include:

- 1) VCT programs
- 2) During post-test counselling
- 3) Presenting for treatment of illness/secondary infection
- 4) As part of home visits
- 5) As hospital inpatient
- 6) Meetings and activities for support groups

This thesis also found that religious leaders at faith-based organizations such as the church and the prayer camps were influential sources of information, wielding as much influence as traditional rulers (i.e., chiefs/Queen Mothers) and administrators at both the national and local levels. Therefore, it is recommended that they be included in the dynamic care for PLWHA. In Ghana, multilateral and bilateral partners, nongovernmental organizations, and faith-based organizations actively participate in the national response, with more than 2,500 community-based organizations and NGOs reportedly implementing HIV/AIDS activities (USAID, 2010). However, there is a lack of communication between these parties since HIV-P women are still receiving an incomplete package of care with respect to nutrition. In general, efforts need to focus on active community mobilisation which can be achieved through partnerships between government, non-government and faith-based organizations as well as support group leaders to enhance communication, consistency of messages and education.

Study strengths

The longitudinal study design of the quantitative study allowed the measurement of predictor variables before the outcome, thus reducing reverse causality. In the regression models for example, data on maternal social capital and socioeconomic status that were collected at 6 months were only used to predict postpartum weight change from 7-12 months. Morbidity data were collected twice a week, reducing errors that may be due to poor maternal recall as well as enabling the active documentation of morbidity data. Field workers were blinded to the HIV status of study participants, thereby reducing differential bias. The quantitative study identified the predictors of postpartum weight change in HIV-P and HIV-N Ghanaian women.

Triangulation of different data sources increases the validity of research findings by giving multiple perspectives on one topic (Patton, 2002b). Within the second part of this study, there was a high degree of triangulation, using information reported by HIV-P women and health workers, as well as

observations, to reach conclusions about the availability and quality of nutrition education provided. In addition, the use of observational data along with interview and focus group data helped validate results and highlight areas where the data conflicted. Focus group discussions with HIV-P women were conducted privately so that the women were comfortable discussing issues related to their health. Furthermore, focus group discussions open a forum of interaction between the members where group dynamics can be observed. HIV-P women were encouraged to voice their opinions even if they differed from those of other participants. Interviews with health care staff, governmental, and non-governmental personnel were conducted individually to reduce the possible influences that others may have on participant responses. All focus group discussions and individual interviews were tape-recorded, translated verbatim into English if conducted in *Krobo* or *Twi*, and transcribed, reducing the possibility of errors from poor recall. The qualitative study documented the quality and availability of nutrition education for HIV-P Ghanaian women and also identified several facilitators and barriers to providing and receiving nutrition education.

Study limitations

The current study has a number of potential limitations. For the quantitative study, status of the participants was only tested in the beginning of the study. The assumption was that a person who is HIV-N remained so throughout the 12 months after birth. It is possible that some HIV-N mothers may have become infected during the study period thus reducing our ability to observe differences between HIV-P and HIV-N groups. In addition, there were no data available concerning gestational weight gain, as women were enrolled while they were already pregnant. Gestational weight gain is an independent predictor of postpartum weight retention (Kac et al., 2004; Olson et al., 2003). There was also no information collected concerning physical activity. This variable has been shown to significantly influence postpartum weight changes among women in developing countries (Goldberg et al., 1991; Nohr et al., 2009). Markers of HIV disease progression, such as CD4 cell count were not investigated. Increased disease progression, as indicated by low CD4 cell

count, is associated with wasting syndrome in HIV patients (Hulgan et al., 2007). Future analyses should control for disease progression between subjects.

The limitations of the qualitative part of this study include the following: private one-on-one counselling sessions were not observed in hospitals or clinics due to confidentiality issues since participants were HIV-P and issues regarding their status beyond the realm of the research topic were discussed privately and were usually sensitive. In addition, the presence of the primary researcher may have affected the content of the group nutrition education sessions observed and focus group discussions. Therefore, while nutrition education appears to be limited, the amount and quality of nutrition education that HIV-P women receive may actually be less than was found in this study. Participant responses to the interview also varied due to differences in language. Some words did not exist in *Krobo* or *Twi* and did not translate directly into English, however, considerations through translations and back-translations were made to find alternative words that had similar meaning. This was a cross-sectional study and because of the sensitive nature of the topic under study, some participants could have benefited from more than one interview. A longitudinal design would be stronger in facilitating rapport and disclosure. Associations between nutrition education and changes in HIV-P women's knowledge were not assessed in the present study. Other studies have used pre-education interviews and post-education interviews with participants to assess changes in knowledge attributed to hospital-based educational activities (Robert et al., 2007). Further studies should examine the associations between nutrition education, changes in HIV-P women's knowledge and changes in HIV-P women's dietary behaviours.

Recommendations for future research

Future research should:

- 1- Examine predictors of postpartum weight change in other HIV-affected communities to confirm the findings of the present study-especially given the unique postpartum weight change patterns of Ghanaian women.
- 2- Examine nutrition education given in health facilities and its relationship with HIV-P women's knowledge and reported practices to confirm and build on the findings of the present study.
- 3- Examine the associations between recommendations given in hospital clinics, the information retained by HIV-P women and changes in dietary practices. The possible mechanisms by which behavior change occurs should be further studied.
- 4- Implement a nutrition education intervention to improve the health of HIV-P Ghanaian women.

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APPENDICES

Appendix A: Interview procedure guide

1) Welcome

Thank you all for taking the time to attend our focus group meeting. You are participating in a study about nutrition education for HIV-P individuals.

2) Introductions and Icebreakers

Meet and introduce the person beside you (name, hobbies/work) OR song/dance. Introduce moderators. Prayer

3) Review Agenda and Duration of Interview

4) Review Goals of Meeting

The purpose of this meeting is to find out about the instructions that you have received in health clinics, and from family, friends or any other sources, concerning nutrition/weight maintenance. This meeting is also to discuss your experiences with health services. This information will help the people who make policies and recommendations to provide better care for your health and nutritional status.

5) Review Ground Rules

A series of questions will be asked, and each question will be followed by discussions. Please feel free to express yourself, while also allowing everyone to have their turn. During your turn, you may respond directly to the question or to someone else's comment, while maintaining respect for the opinions of others. You may also choose not to answer. All of the questions and discussions will be translated throughout the meeting. Please take your time to respond, and ask for clarifications at any time. Each of

your opinions is important to the study. So, please feel free to express your own views especially if they differ from those of other members of the group. At the end, we will review what has been said to make sure that we understand your opinions.

The meeting will be audio-recorded. The tape-recording will only be used to help remember the discussion and not for any other purpose. Only the researchers will listen to the tapes.

6) Questions and Discussions

7) Wrap-Up

8) Thank Participants for Time

Appendix B: Focus Group Discussion Guide

Opening – present and past experiences to set context

1) Would you like to tell me what a typical day is for you?

Probes

- ◆ When does mealtime happen?
- ◆ Who prepares the food?
- ◆ Have your routine changed? Have anything changed in the household since HIV infection?

Knowledge, opinions – Nutrition

2) HIV positive people must eat well to keep healthy, Can you tell me about any nutrition messages you have received in relation to HIV?

Probes

- ◆ What information?
- ◆ Who gives the information/messages?
- ◆ When?

- ◆ Which teaching materials are used?

Opinions, experiences – health care

3) Can you tell me about your experiences with health services?

Regarding dietary counselling and nutrition education?

Probes

- ◆ The role of health services in providing information about nutrition during HIV-infection?
- ◆ What info?
- ◆ Who gives the information?
- ◆ Interactions with health care providers (e.g., doctors, nurses, multiple people in the center e.g. nurses aids)?
- ◆ When?
- ◆ Which teaching materials are used?
- ◆ If you have/had any questions, is there room for questions/clarifications?
- ◆ Is the information received from health services consistent (between health workers and mother, and among health workers)? Conflicting info?
 - How do you resolve that conflict?
 - Consistency - similar experiences for other participants?
- ◆ Are there any problem areas?
- ◆ Why do you think this might be?

Opinions – closing suggestions

4) Tell me about some of the challenges to obtaining health care.

- ◆ Are these typical examples or are there other reasons?

5) What info is missing/would be useful?

6) How can health services improve? Learn or integrate to help?

7) In your opinion, how do you think HIV affects body weight? What are the consequences?

- 8) **That covers the questions that I wanted to ask. Your comments have been very helpful. Is there anything else that you would like to add? Any questions?**

Appendix C: Health Care Provider Interview Guide

Opening – present and past experiences to set context

- 1) **Can you tell me about a typical day for you at work?**

Probes

- ◆ Job title
- ◆ Years working in this position

Experiences – interactions between health care providers and HIV-positive women

- 2) **I recognize that HIV individuals interact with different services in the health services, when do you usually interact with HIV-positive patients?**

Probes

- ◆ How are you involved?
- ◆ What is your role in providing assessment, education and counselling to HIV-positive patients?
- ◆ What info do you give that would influence their nutritional status?
- ◆ Which materials are used to teach mothers?
- ◆ When is this care given (contact time)?
- ◆ What is usually the focus of the counselling session?
- ◆ Which assessment methods are used?

- 3) **Who else is involved in nutrition education? (Get a sense of how the team functions together? Team or individual)**

Probes

- ◆ Roles of doctors? Nurses? Other health workers?
Organisations? Local ministries? Pharmacists?

- ◆ Impression of other health care providers (get a sense of how the team functions together? Team or individual)

Knowledge, opinions – nutrition education

4) Over the past month, what information have you included when counselling patients?

Probes

- ◆ How to increase energy intake/ macronutrient requirement?
- ◆ How to schedule meals and medication timings?
- ◆ How to prevent infection through proper hygiene and food preparation methods?
- ◆ How to manage HIV symptoms such as oral thrush, nausea, and diarrhoea?

5) How did you learn about nutrition requirements for HIV-positive patients and their effects on the overall health and disease progression?

Probes

- ◆ When and where did you receive this information?
 - Education (years, type)
 - Training - In-service training (frequency, content)
 - Other sources of info (i.e. follow-up courses, reading material, unofficial training)

Experiences, opinions – facilitators and barriers to optimal health care

6) Can you describe a counselling session that you have had with a patient?

Probes

- ◆ Mother's doubts about nutrition
- ◆ Limits to abilities and control
- ◆ Are these typical examples or are there other reasons?

7) During your counselling session, did you realize that the HIV-positive women/mother has received any other information?

Probes

- ◆ What are they?
- ◆ From whom?
- ◆ How does that influence counselling them/ your ability to work with the HIV-positive women/mother how does it influence your recommendations?

8) In your opinion, what are the facilitators and barriers that you face when delivering nutrition education?

- ◆ Hopelessness vs. dedication to delivering accurate nutritional information

Opinions – closing suggestions

9) What are your suggestions for how a nurse/health worker/doctor could give a HIV-positive women/mother the care and advice she needs to successfully maintain their weight and nutritional status?

10) That covers the questions that I wanted to ask. Your comments have been very helpful. Is there anything else that you would like to add? Any questions?

If you think of anything else – contact info.

Appendix D: Queen Mothers' interview guide

Opening – present and past experiences to set context

1) What is your role in the Queen Mother's Association?

Probes

- ◆ Years in this position

Experiences – setting context, nutrition education

2) What activities are Queen Mothers' involved in in terms of HIV-related nutrition education?

Probes

- ◆ When? Who is involved? (When do you usually interact with HIV-positive women? (and how?))
- ◆ Could you tell me what this is built on, do you have past experiences that have lead you to this path today

Knowledge, opinions – nutrition education

- 3) Over the past month, have you provided nutritional advice to HIV-positive women? Can you share what advice you give and teaching material you use?**

Probes

- ◆ How to increase energy intake?
- ◆ How to schedule meals and medication timings?
- ◆ How to prevent infection through proper hygiene and food preparation methods?
- ◆ How to manage HIV symptoms such as oral thrush, nausea, and diarrhoea?

- 4) How did you learn about nutrition requirement for HIV-positive women and their effect on the overall health and disease progression?**

Probes

- ◆ When and where did you receive this information?
 - Education (years, type)
 - Other sources of info (probe as many as possible)

- 5) In your opinion, where do HIV-positive mothers receive their information about nutrition?**

Probes

- ◆ Are these sources of info reliable? (rate the source for reliability)

Opinions, experiences – facilitators and barriers to nutrition education

- 6) In your community, do you think some HIV-positive mothers have difficulty maintaining their weight/ have poor nutritional status?**

Probes

- ◆ Why do you think they are having difficulty/success?
- ◆ What is different about mothers who have difficulty and success?
- ◆ Are these typical examples or are there other reasons?

Opinions – closing suggestions

- 7) Do you have any suggestions to help mothers to successfully maintain weight and health?**

Probes

- ◆ How can health services integrate those suggestions? What info is missing/would be useful?

- 8) That covers the questions that I wanted to ask. Your comments have been very helpful. Is there anything else that you would like to add? Any questions?**

If you think of anything else – contact info.

Appendix E: Governmental and non-governmental organization's personnel interview guide

- 1) Tell me about a typical day's work**

-# years in position

-Job title

- 1) Tell me about your role in/activities related to nutrition education related to HIV-infection. How has this changed (past yr? 5yrs? 10yrs?)**

- ◆ What, when, where, how?

- ◆ Which teaching materials?

- 2) Tell me about nutrition education provision in Accra and in the Eastern Region.**

- 3) How do you think they compare to the rest of Ghana?**

- ◆ What are the challenges?

- ◆ What facilitates nutrition education promotion?

- 4) Tell me about your role in the hospitals/health centers in terms of nutrition education. How has this changed (past yr? 5yrs? 10yrs?)**

- 5) Who is responsible for teaching/promoting the importance of good nutrition in the community hospitals/health centers?**

- ◆ How are they trained?

i. Training manuals/materials?

ii. In-service education?

- iii. How often?
- iv. Who gives seminar?
- v. Topics?
- vi. How are they evaluated?
- vii. What are the actual teaching practices in the hospital?
- viii. Who trains, what information, and when?

6) Where else do mothers learn about nutrition

- School?
- Media?

7) What are your suggestions for improving nutrition education for HIV-positive adults? Pregnant and lactating mothers?

- In hospitals?
- In community?

8) Those are all the questions that I have. Thank you for your comments. They have been very helpful. Is there anything else that you'd like to tell me? Any questions

Appendix F: Individual Interview - Informed Consent Form

Title of Study: Nutrition Education and Programs in HIV-affected Communities.

Researcher: Hoda Chehayber, McGill University

Supervisors: Grace Marquis, Ph.D., School of Dietetics and Human Nutrition, McGill University

: Anna Lartey, Ph.D., Dept. of Nutrition and Food Science, University of Ghana

Introduction

You are invited to take part in a research study. Please take your time to decide whether you would like to participate. You may ask questions at any time.

The purpose of this study is to examine how nutrition education services are provided to communities affected by HIV and what determines individuals' use of those services.

Description of Procedures

If you agree to participate, your involvement in this study will include an audio-recorded interview, lasting up to 1½ hours. You may refuse tape-recording or ask to stop the tape at any time.

During the interview, you will be asked about nutrition education, food programs, recommendations on traditional herbs, medicines and special foods used to improve nutrition among HIV-infected individuals. Challenges to good nutritional practices and suggestions for improved health care will also be discussed. You may choose to not answer any question that you do not wish to answer or that would make you feel uncomfortable.

Risks

There are no risks to you for participating in this study.

Benefits

There is no direct benefit to you for participating in this study; however, the information gained may benefit communities and health services by providing insights about maternal care and the factors affecting the delivery and use of nutrition education. This is expected to ultimately result in better nutrition for women living with HIV.

Compensation

Participants will not be compensated. However, a small thank you gift will be given to participants for their help with the project.

Participant Rights

Your participation is completely voluntary. You may choose not to participate or to leave the study at any time, without penalties.

Confidentiality

All records that may be used to identify you or that contain information about you will be kept confidential. You will be assigned a unique code number, and this code will be used on forms and interview transcripts instead of your name. Only the study's researchers will have access to the documents linking your name to your code. Documents and audio-tapes will be kept in a locked cabinet, and electronic computer files will be password protected.

Upon completion of this study, the files linking your name to your code number will be erased. Any published results will keep your identity confidential, and your name will not be linked to interview quotes.

Questions or Problems?

You are encouraged to ask questions at any time during this study. For more information about this research project, please contact :

Hoda Chehayber hoda.chehayber@mail.mcgill.ca School of Dietetics and Human Nutrition 21,111 Lakeshore Road Ste Anne de Bellevue, Qc H9X 3V9 Canada Telephone: (+1) 514-398-7839	Dr. Grace Marquis <u>grace.marquis@mcgill.ca</u> CINE Building 21,111 Lakeshore Road Ste Anne de Bellevue, Qc H9X 3V9 Canada Telephone: (+1) 514-398-7839	Dr. Anna Larrey <u>aalarrey@hotmail.com</u> Department of Nutrition and Food Science University of Ghana P.O. Box LG134 Legon, Ghana Telephone: (+233) 21-513294
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If you have questions about your rights as a research participant, or if you would like to verify ethical approval of this study, please feel free to contact: Chair McGill Research Ethics Board, Faculty of Agricultural and Environmental Sciences c/o Macdonald Research Office at (+1) 514-398-8716, or by e-mail research.macdonald@mail.mcgill.ca, or the Institutional Review Board Chairman at Noguchi Memorial Institute for Medical Research, Ghana at (+233) 21-500374.

Participant Signature

Your signature indicates that you agree voluntarily to participate in this study, that the study has been explained to you, that you have had enough time to read the consent form and that your questions have been answered to your satisfaction.

I agree to be tape-recorded ____YES ____NO

_____	_____
Participant's Name (Printed)	Date

Participant's Signature/Thumb-Print	
_____	_____
Researcher's Signature	Date

Appendix G: Focus Group Interview - Informed Consent Form

Title of Study: Nutrition Education and Programs in HIV-affected Communities.

Researcher: Hoda Chehayber, McGill University

Supervisors: Grace Marquis, Ph.D., School of Dietetics and Human Nutrition, McGill University

:Anna Lartey, Ph.D., Dept. of Nutrition and Food Science, University of Ghana

Introduction

You are invited to take part in a research study. Please take your time to decide whether you would like to participate. You may ask questions at any time.

The purpose of this study is to examine how nutrition education services are provided to communities affected by HIV and what determines individuals' use of those services.

Description of Procedures

If you agree to participate in this study, your involvement will include taking part in one group interview, lasting a maximum of 2 hours. This interview will be audio-recorded.

During the focus group discussion, you will be asked about nutrition education, food programs, use of traditional herbs, medicines and special foods used to improve nutrition among HIV-infected individuals. Challenges

to good nutritional practices and suggestions for improved health care will also be discussed. You may choose to not answer any question that you do not wish to answer or that would make you feel uncomfortable.

Risks

Because this discussion is occurring as a focus group with many people, the information that you reveal during the focus group discussion cannot be guaranteed to be kept confidential by all participants. Sharing of personal and sensitive information may have social and/or emotional risks. All focus group members will be encouraged to keep strict confidentiality of the information shared within the group.

Benefits

There is no direct benefit to you for participating in this study; however, the information gained may benefit communities and health services by providing insights about maternal care and the factors affecting the delivery and use of nutrition education. This is expected to ultimately result in better nutrition for women living with HIV.

Compensation

Participants will not be compensated. However, a small thank you gift will be given to participants for their help with the project.

Participant Rights

Your participation is completely voluntary. You may choose not to participate or to leave the discussion group at any time. Whether you participate or not, there will be no effect on the services you are receiving.

Confidentiality

All information collected will not be linked to you personally. No identifier will be recorded. Only the study's researchers will have access to the information. Documents and audio-tapes will be kept in a locked cabinet, and electronic computer files will be password protected.

Upon completion of the analysis of this study, the audio tapes will be erased. Your name will not be linked to any interview quotes or data.

Questions or Problems?

You are encouraged to ask questions at any time during this study. For more information about this research project, please contact:

Hoda Chehayber hoda.chehayber@mail.mcgill.ca School of Dietetics and Human Nutrition 21,111 Lakeshore Road Ste Anne de Bellevue, Qc H9X 3V9 Canada Telephone: (+1) 514-398-7839	Dr. Grace Marquis <u>grace.marquis@mcgill.ca</u> CINE Building 21,111 Lakeshore Road Ste Anne de Bellevue, Qc H9X 3V9 Canada Telephone: (+1) 514-398-7839	Dr. Anna Lartey aalarley@hotmail.com Department of Nutrition and Food Science University of Ghana P.O. Box LG134 Legon, Ghana Telephone: (+233) 21-513294
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If you have questions about your rights as a research participant, or if you would like to verify ethical approval of this study, please feel free to contact: Chair McGill Research Ethics Board, Faculty of Agricultural and Environmental Sciences c/o Macdonald Research Office at (+1) 514-398-8716, or by e-mail research.macdonald@mail.mcgill.ca, or the Institutional Review Board Chairman at Noguchi Memorial Institute for Medical Research, Ghana at (+233) 21-500374.

Participant Signature

Your signature indicates that you agree voluntarily to participate in this study, that the study has been explained to you, that you have had enough time to read the consent form and that your questions have been answered to your satisfaction.

I agree to be tape-recorded ____YES ____NO

Participant's Name (Printed)

Date

Participant's Signature/Thumb-Print

Researcher's Signature

Date